News about

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For further information on properties of Hycar 1072, write Dept. FA-1, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

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Highlights Sidelights *of the News...*

January, 1960

McNeil Machine & Engineering Co. and a firm of Cleveland investment bankers have announced that they will provide $2,750,000 in new capital for the reopening of the Sun Rubber Co. . . . The refinancing program will enable Sun Rubber to pay off creditors in full and leave adequate working capital for operations . . . T. W. Smith, Jr., who has headed Sun Rubber for a number of years, will continue as president (page 662).

Stockholders of a retail furniture chain, Spear & Co., New York, N. Y., have approved the acquisition of the Acme-Hamilton Mfg. Corp. . . . However, a shareholder in Acme-Hamilton has obtained a restraining order barring the transfer of assets (page 671)

The General Services Administration has announced that the government is putting up for sale its butadiene plant at Louisville, Ky. . . . According to GSA, the sale will be made when sealed bids are opened on February 9. . . . The government's cumulative inventory value of the plant is $30 million . . . The plant was previously put up for sale in 1953, but attracted no buyers (page 662).

Goodrich has been granted a patent on diaphragms, or safety chambers, for use in automobile tires . . . The invention covers a molded rubber and fabric diaphragm, which can be inserted in tubeless tires to provide a second air chamber for added safety if air should escape from the tire . . . The safety diaphragm was invented by Clarence E. Snyder, a Goodrich tire engineer, now retired (page 670).

The board of directors of Farrington Manufacturing Co., Needham Heights, Mass., has approved the acquisition of the Coated Fabrics Division of Sawyer-Tower, Inc., Watertown, Mass. . . . Purchase price of the acquisition, a cash transaction, has not been disclosed . . . This was the third acquisition of Farrington in 1959 (page 677).

Firestone has announced plans for the introduction of a premium quality tire made of butyl rubber . . . The company points out that the new tire will have a premium tread depth, and a tread design which makes maximum use of the butyl rubber (page 678).

A Common Pleas Court jury in Akron, Ohio, has returned a defendant's verdict in a $20,650 damage suit contending that tire manufacturers are liable for injuries to motorists hurt when tires blow out . . . The test suit was brought against Seiberling (page 666).

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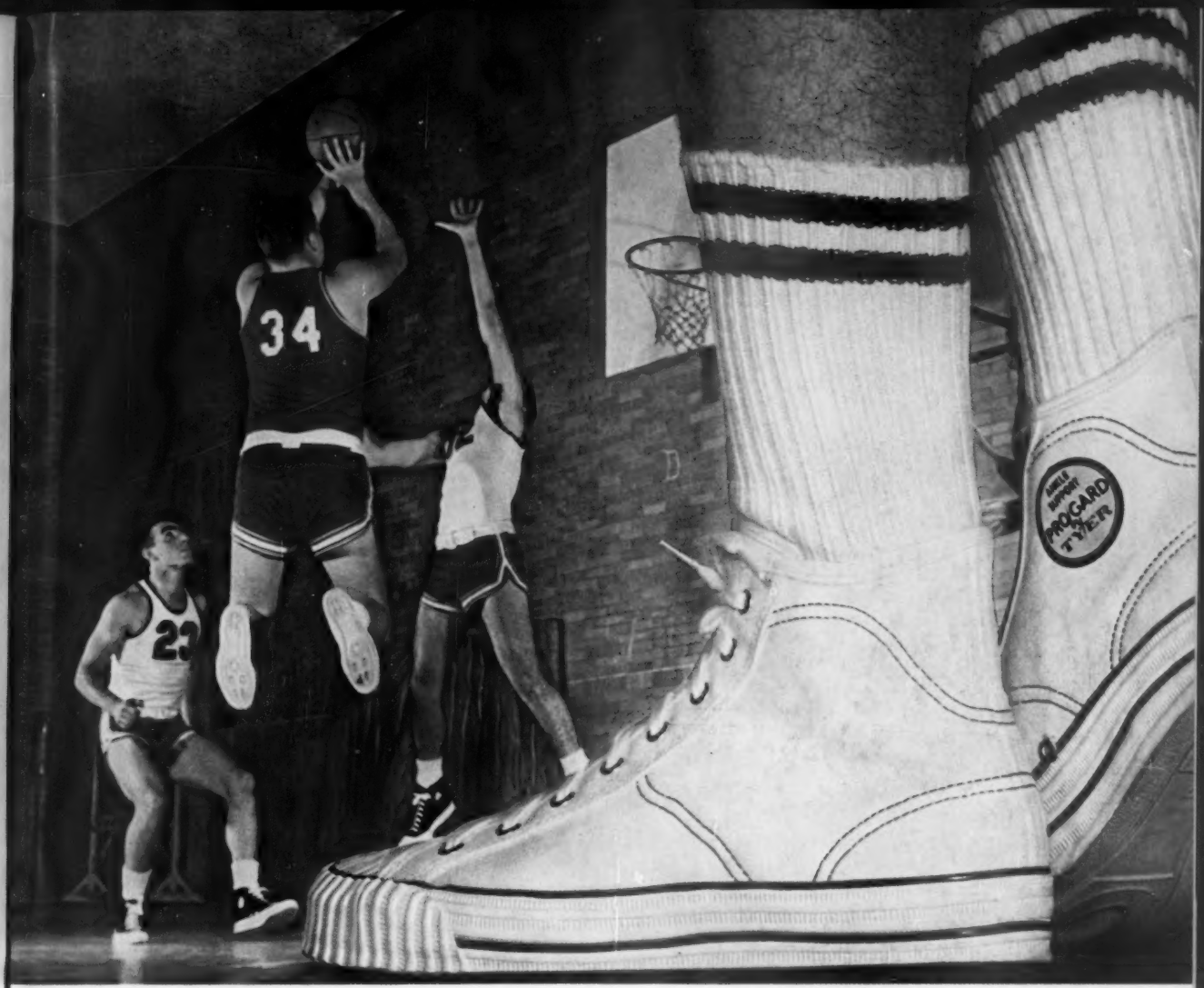

Footwear manufactured by Tyer Rubber Company, Andover, Mass.

How to get the jump on competition

You can't miss with a quality product that's got an exclusive feature of wide appeal. For example, consider the basketball shoes above. They offer everything you'd expect—sure-footed traction, light weight, good resilience, attractive appearance, easy washability—*plus* an "exclusive" that's caught on fast.

This sales-sparking "extra" is a combination ankle support and protective guard that's built right into the shoe. To produce this unique feature, a versatile sponge rubber compound was needed. Chosen: PLIOFLEX—for its unrivaled uniformity and good blowing characteristics.

In other parts of the shoe, PLIOFLEX was used because of its light color and remarkable retention of calendered designs. In the sole, PLIOFLEX provides outstanding nonslip qualities and exceptional flexibility. It also assures better adhesion of rubber to canvas. Throughout the shoe, PLIOFLEX means long wear. And—happily for the manufacturer—PLIOFLEX usually means a substantial reduction in costs.

If you're looking for a compound that can put your product on a better competitive footing, it will pay you to look into PLIOFLEX—now used in more products than any other synthetic rubber. For complete information, write Goodyear, Chemical Division, Dept. M-9419, Akron 16, Ohio.

GOODYEAR

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Pliofex—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Photograph taken through the courtesy of Crown Rubber Company, Fremont, Ohio

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How can PLIOLITE LATEX 5352 help you put your product out in front? You'll find it makes an excellent, economical cushioning for *many* products. Write for details and technical assistance to Goodyear, Chemical Division, Dept. M-9419, Akron 16, Ohio. Or talk to your local latex compounder.

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Look closely at the PLIOFLEX packaging materials above and you'll notice that Goodyear has put some important "extras" into their design. Example: PLIOFLEX bags are distinctively marked and color coded for split-second identification, more efficient storage. Inside those 5-ply polyethylene-laminated bags are PLIOFLEX bales which can be talc dusted or wrapped in polyethylene film—depending on your need.

When it comes to shipping, once again—you call it. Bales or bags of PLIOFLEX can be shipped individually or in quantity on nonreturnable, no-charge wooden pallets. Prefer pallets? Palletized shipments come by truck or carload—take your pick. Bulk shipments? They arrive in special *unitized* containers—each one holding 33 film-wrapped bales.

"Seagoing Boxcars" may speed your order from our Houston warehouse. This unique sea-land system assures prompt, economical delivery to Eastern Seaboard customers. *Wherever* you need PLIOFLEX, you'll find it comes safely, swiftly from one of Goodyear's four strategically located supply points. And it comes ideally packaged for your *specific* purpose. More information on PLIOFLEX packaging and product advantages—plus latest *Tech Book Bulletins*—are yours for the asking. Write to: Goodyear, Chemical Division, Dept. M-9419 Akron 16, Ohio.

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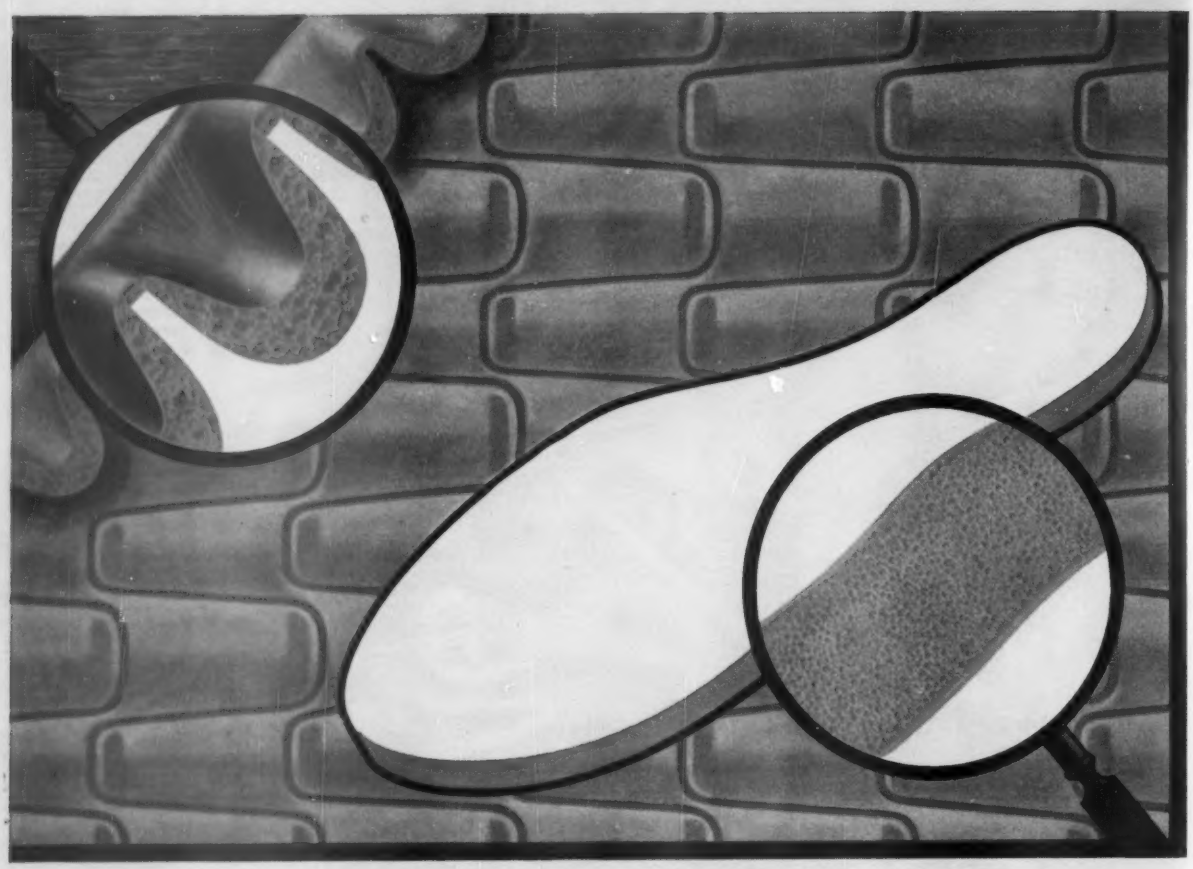
Plioflex—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



NEW! S-1509 rubber for sponge

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Light Color—Non-staining and non-discoloring S-1509 is excellent for white stocks not only because of its own inherent light color but also because it eliminates discoloring peptizing agents.

Low Viscosity—S-1509 has a viscosity range of 30-38; it needs no breakdown and comes to you ready for immediate processing in sponge applications.

No Excessive Tack—S-1509 reduces the tendency of compounds to stick on the mill roll or mold surface.

Outstanding Physical Properties—Properties of S-1509 stocks closely compare with those of plasticized high Mooney counterparts such as S-1502 compounds.

Superior Mold Flow—Stocks made with S-1509 provide sharp design transfer from the most intricate mold to the finished product.

Low Water Absorption—Because S-1509 is coagulated with alum, it is recommended for applications which require low water absorption.

S-1509 may be used to advantage in other products than sponge: wherever a combination of the above features is desired.

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SHELL

capitol cues

THE OUTLOOK FOR BUSINESS IN 1960 has now taken fairly firm shape in the thinking of economists in both business and government. The forecast is for high prosperity: The new year will see substantial—even boomy—growth. At times, inventory-building may get hectic. Of course, there will be some weak spots. But for most businessmen and consumers, 1960 will be prosperous. (These estimates assume that the steel strike will NOT be resumed in 1960.)

THE BIG BUSINESS GAINS WILL COME IN THE FIRST HALF of the new year. Production of autos and steel will sparkle, particularly, and there will be some solid gains in soft goods. The second half probably will show a marked slowing in the rate of upturn. Home-building will dip and the effect of the federal Budget surplus will show up. But there isn't likely to be a decline.

The economy will get most of its lift from three key sources:

- Business will spend $4-5 billion—15%—more on new plant. Inventory-building will be large, in the wake of the strike. The buying will give business a $10 billion shot-in-the-arm.
- Consumers will spend 5% more in 1960, matching the gain of 1959. Money income will rise 6% but price hikes will dilute this. Salaries and wages will expand; farm income will drop.
- Government policies may exert some drag. Spending may rise $1 billion, with revenues up more. So, instead of pumping in billions, the Treasury will be taking some money out.

THE ECONOMY WILL GROW BY A HEALTHY 6% DURING 1960, measuring in terms of Gross National Product—total output of goods and services. This will lift GNP to $506.5 billion for the year. The first half will see total output at a rate of $503 billion; in the second half, the rate will rise to $510 billion.

LABOR RELATIONS IN RUBBER WILL BE FAIRLY CALM IN 1960—at least in contrast to the rough bargaining year faced by industry generally. (Some experts think the new year will be even stormier than 1959.) The outlook in rubber is different because the industry's labor contracts provide for reopening on wages only during 1960. Contract terms do not come till '61.

Thus, the explosive work-rules issue, which is at the root of the deadlock in steel, won't be an element in the rubber picture in 1960. Already, it is an issue in the railroad negotiations and seems certain to figure in the bargaining that's coming up in aircraft and electrical manufacturing.

Bargaining in rubber is expected to get rolling by Summer. Observers in Washington expect wage increases of about 10¢ an hour to emerge from the talks. Here's how they get it:

- 6¢ an hour is what the auto workers are due to get next September 1—and autos are a pattern-setter for rubber.
- 2¢ an hour has already been won by auto and other unions as a result of increases in the cost-of-living indexes.
- 2¢ an hour in additional cost-of-living benefits is also seen as likely next year on the basis of expected hikes.

Rubber workers will want as much as the other unions get.

capitol cues (cont'd)

PRICE INCREASES DURING 1960 WILL BE MODERATE, in the view of government experts. At the consumer level, they expect the over-all index to rise around 1½%. Services—rents, utilities, medical care, transportation, etc.—will be moving up, along with clothing. Food will fall, but not as much as in 1959. At wholesale, hikes will average 1%, with some drops in farm products tending to offset the broad range of increases anticipated in industrial materials.

There is another appraisal of wholesale prices worth noting. Experts at the Federal Reserve System are fearful that the wage settlement in steel, plus the rush to build inventories, may push commodity prices up much faster—at a 4% to 5% rate.

LABOR COSTS WILL INCREASE ABOUT AS MUCH in 1960 as they did in 1959. Average hourly pay in manufacturing will go up 8¢, to $2.30. In 1959, it rose 9¢. Several million union workers are assured of this large an increase under deferred compensation clauses written into contracts during past years. These deferred increases are expected to be the target for the rest of labor.

THE NEW YEAR WILL BE A RECORD ONE IN CORPORATE PROFITS. Higher output, big jumps in sales, and an upward trend in prices will lift the net somewhat faster than costs. Profits before taxes may reach $54 billion, as compared with 1959's $48 billion. Productivity is rising and industry is likely to be operating at around 85% of capacity, and this will tend to enlarge margins.

THE TIGHT MONEY SQUEEZE WILL CONTINUE FOR A WHILE—at least through the first half of 1960. Credit will not ease noticeably, but it probably won't get much tighter, either. There'll be big demands for money early in 1960, as business tries to rebuild its inventories. But that is usually a period of seasonal easing, and this will greatly help the economy to get by.

Note, however, the real possibility that the prime rate—the rate which banks charge their biggest and best customers—may be raised in late Spring, to 5½%. This, in turn, would force up all of the other money rates which businessmen must pay.

SPENDING FOR NEW CONSTRUCTION WILL DIP A BIT during 1960, despite the expansion in the rest of the economy. The dollar value of work put in place will be down about 1%, to $54.1 billion, from the $54.8 billion for all 1959. Costs will be higher; physical volume of work put in place will fall 3-4%.

- Public outlays by federal, state, and local governments will rise about 2% in the coming year, compared with 1959's gains of 10%. Biggest gains will come in institutional, sewer and water, and military work. Spending for roads will be about the same, while expenditures for public schools will decline.
- Private spending will be going down 3% in 1960, mainly as a result of a sharp dip in outlays for housing. Tight money and the end of government help for low-cost homes will mean a decline in housing starts from 1.3 million to 1.1 million.

There'll be few dips in building materials sales in 1960.
- Cement will do about as well in 1960 as it did during 1959.
- Clay products will drop a bit in sales in the coming year.
- Paints should see sales just about matching 1959 volume.

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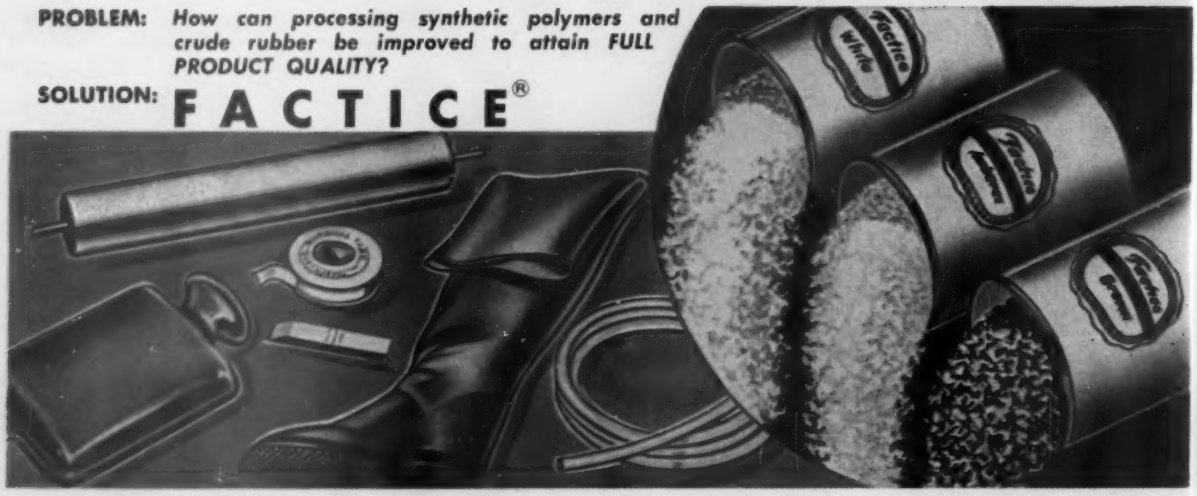

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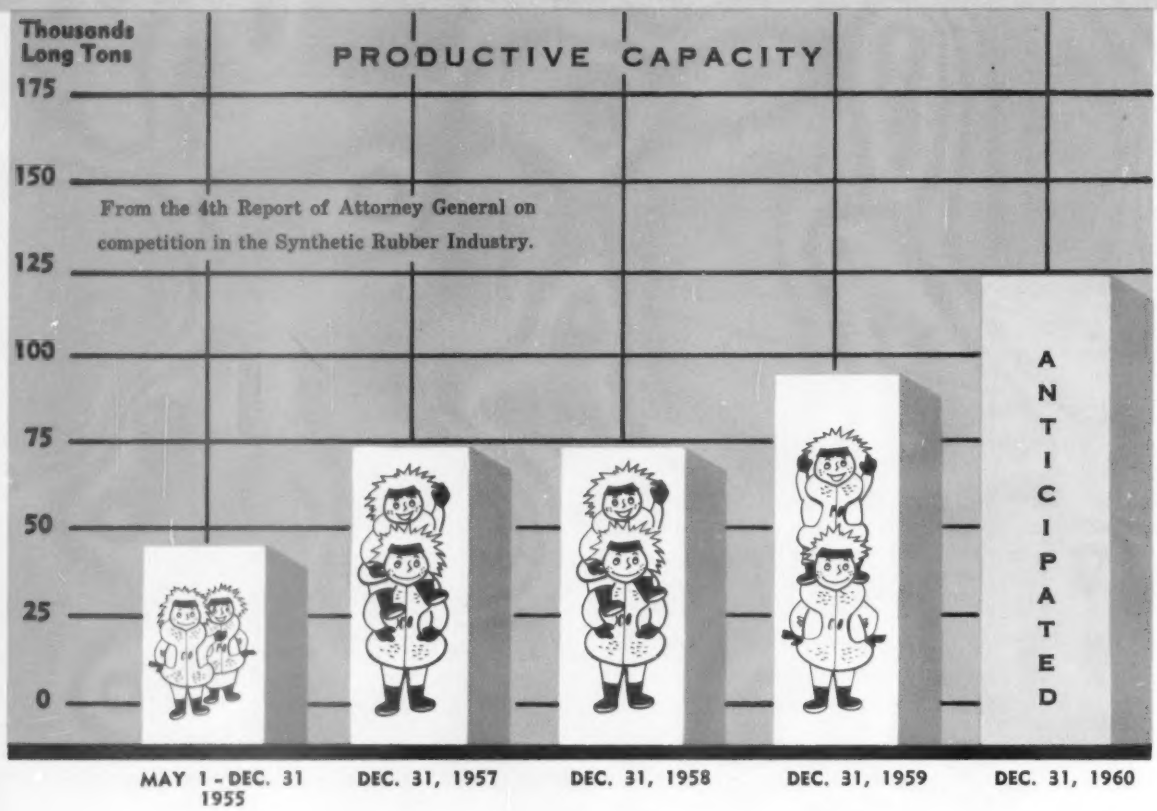

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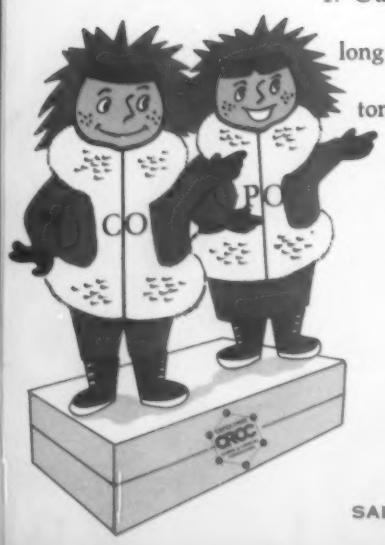

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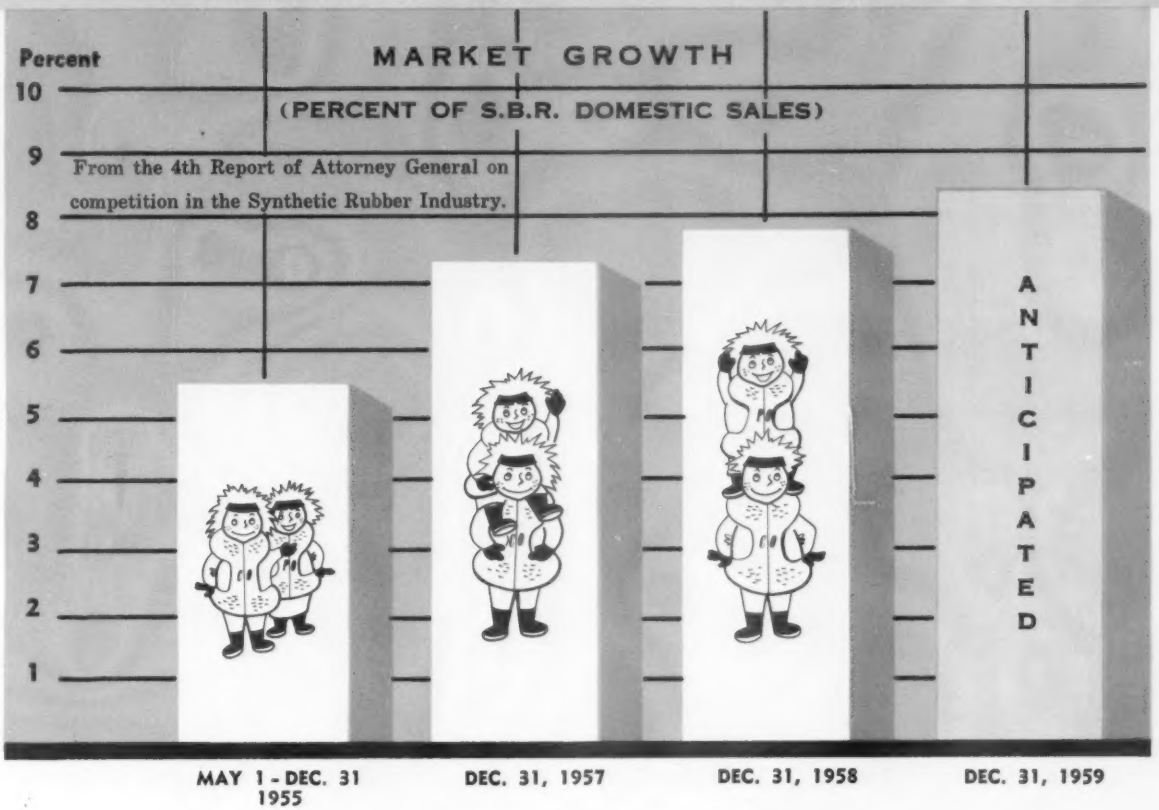

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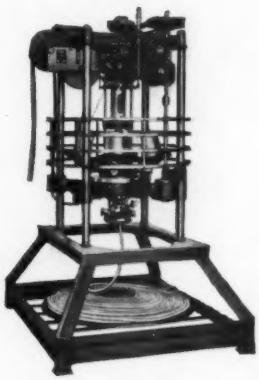

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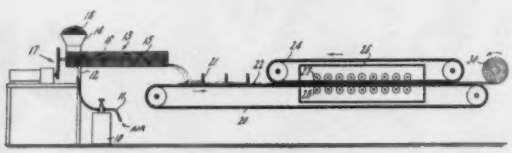
PATENT REVIEW

by Melvin Nord

Reclaiming Latex Foam Rubber Scrap

U. S. Patent 2,892,216, issued June 30, 1959 to Robert N. Steel and assigned to United States Rubber Co., describes a method of reclaiming foamed or cellular expanded or blown scrap, and converting it into a form in which it is bound into a continuous mass by a cured polyurethane elastomer.

As shown in the diagram, a 70 per cent by weight solution of an uncured polyurethane intermediate in methyl isobutyl ketone, to be utilized as a spray solution, is charged to a spray supply container (10) while connected by a line (11) to a suitable source of compressed air, the arrangement being such that the solution could be sprayed



from the nozzle of a spray gun (12) connected to the tank. The spray gun is mounted adjacent to a mixing device (13), comprised of a feed hopper (14) and a longitudinally extending cylinder (15) constructed of wire screening. A mixing screw (16) extends through the cylinder and is rotated by driving means (17).

Shredded, vulcanized latex foam rubber scrap (18) is fed to the hopper (14), and is advanced through the mixing cylinder (15) by the action of the rotating screw (16). At the same time, the solution of uncured polyurethane intermediate contained in the tank (10) is sprayed by the spray gun (12) through the cylindrical screen (15) onto the sponge rubber crumbs (18) as they are advanced through the mixing chamber. To lower the viscosity of the spray solution and thereby facilitate the spraying operation, the spray solution supply tank may be heated to a suitable temperature, e.g., 160-170° F., by suitable heating means.

As the sprayed crumbs emerge from the delivery end of the mixing device, they are deposited on a conveyor belt (20), which proceeds horizontally beneath a series of transverse spreader bars (21) that serve to spread the treated foam rubber crumbs out into the form of a uniform mat (22). The belt (20) is preferably made of a laminate of glass fibers and polyester resin; it is

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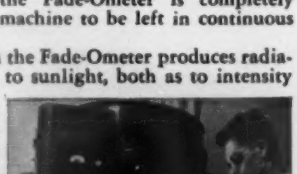
The Carbon Arc Lamp in the Fade-Ometer produces radiation at the sample similar to sunlight, both as to intensity and spectral distribution.



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PATENT REVIEW

perforated with numerous small holes or other similar openings in order to permit vapors and gases to pass through. After the treated crumbs have been spread out on the first belt (20), they pass into contact with a second similar belt (24) placed immediately above it and spaced from it by a vertical distance which is equal to the desired thickness of the final sheet. This spacing is such that the loose rubber crumbs are appreciably compressed at this stage.

The two moving belts (20 and 24) with the compressed layer of treated crumbs (22) sandwiched between, then pass into an oven (26) within which an atmosphere of live steam is maintained at a temperature of about 212° F. Upper and lower guide rolls (27 and 28) maintain the desired spacing of the upper and lower belts, while the steam passes through the perforations in the belts into the mass of treated foam crumbs. The speed at which the conveyor belts are advanced is such that the treated foam rubber crumb is exposed to the steam for about 10 or 15 minutes.

As a result of this treatment, the polyurethane intermediate acquires a substantial amount of cure by the action of the water on the available isocyanate groups in the intermediate. At the same time, carbon dioxide is generated by the chemical reaction, so that the resulting polyurethane elastomer is spongy. The cured elastomer forms a strong, integrating network which permeates and surrounds the latex foam rubber particles, adhering firmly to them, so that the sheet (22) takes the form of a continuous integral mass, which may be wound up into a roll (30) as it comes from the machine. The roll may be dried subsequently to remove residual moisture and any remaining organic solvent.

Rubber Containing Metal Oxides

U. S. Patent 2,898,391, issued August 4, 1959 to Ernest Wagner and Hermann Westlinning, assigned to Deutsche Gold- und Silber-Scheideanstalt vormals Roessler, describes a method for using metal oxides as the reinforcing filler for natural rubber.

It is known that finely divided, pyrogenically produced metal oxides such as silica, alumina and titania, formed in a flame by the hydrolysis or oxidation of the corresponding metal halide at elevated temperatures, are excellent reinforcing agents for natural rubber. However, when any one of these is used alone, difficulties are caused. When silica is used, the compound is extremely stiff and hard, as well as scorchy. When alumina

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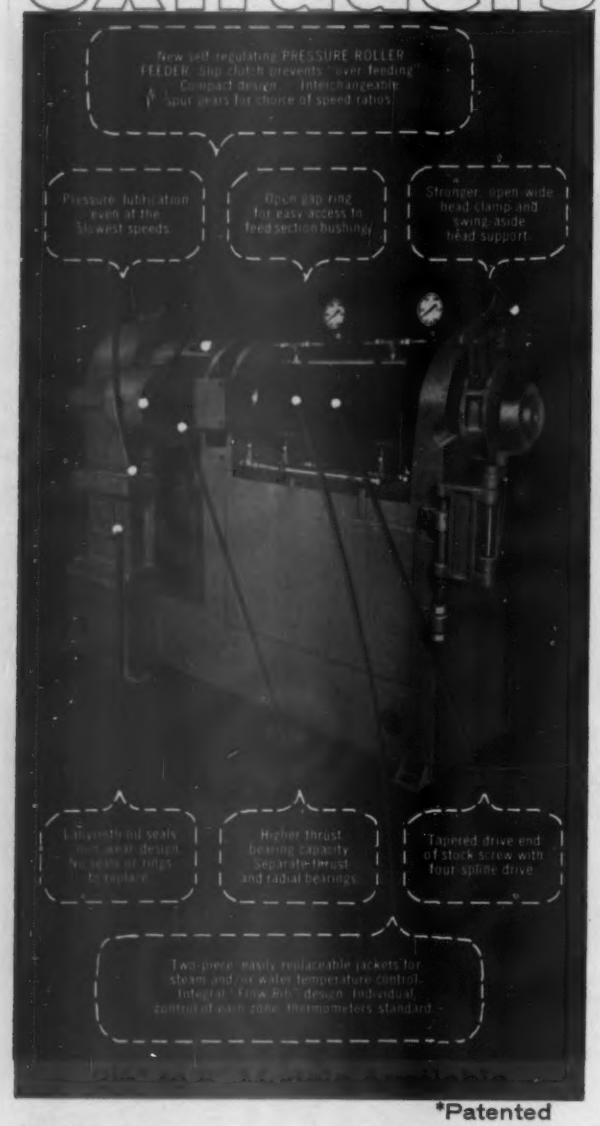
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PATENT REVIEW

or titania are used alone, their bulk weights increase the weight of the compound to an objectionable extent.

In the present process these difficulties are avoided by using silica with alumina and/or titania. The oxide must be very finely divided, i.e., in the particle range below 50 millimicrons.

Nitroso Compound for Butyl Rubber

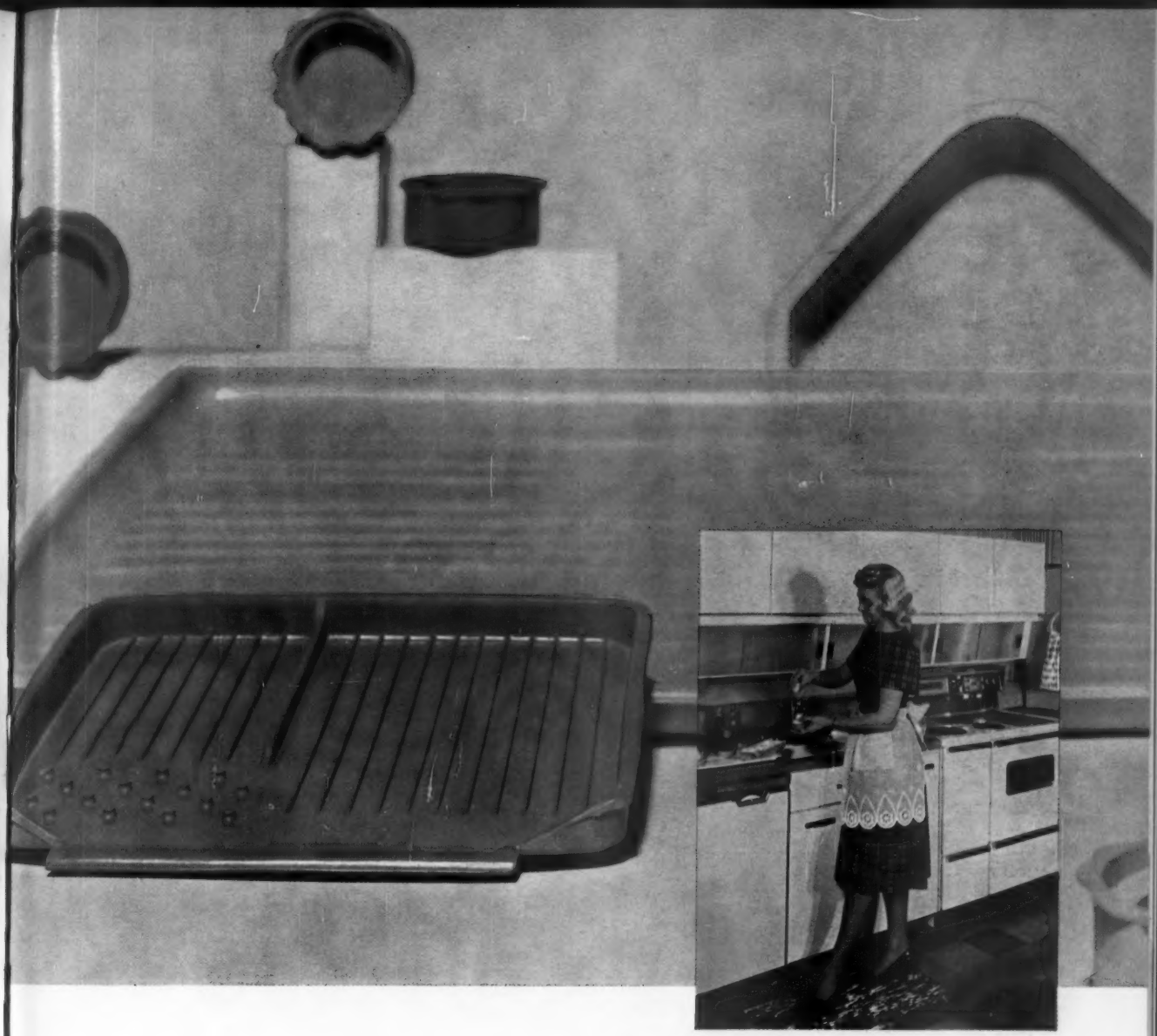
U. S. Patent 2,895,937, issued July 21, 1959 to Francis P. Baldwin and Samuel B. Robison, assigned to Esso Research & Engineering Co., describes a process for heat-treating butyl rubber with an aromatic nitroso compound.

It has been found that butyl rubber can be tremendously improved in filler-reinforcement properties if it is first subjected to reaction with small amounts (e.g., 0.5-3.0 per cent by weight) of a mono- or polynuclear aromatic nitroso compound, such as paranitrosophenol or o-nitroso cresol. The reaction may be carried out at 260-310° F. in a conventional rubber mixing mill.

Other Patents of Interest

Subject	Inventor or Assignee	Patent No.	Date
Silicone supplemented fillers and rubbers	Ellis H. Phreaner et al	2,891,923	6/23/59
Low-hysteresis processing of rubber	United States Rubber Co.	2,891,924–6	6/23/59
Extrusion apparatus	United States Rubber Co.	2,892,212	6/30/59
Tire building apparatus	The Armstrong Rubber Co.	2,893,467	7/ 7/59
Rubber draft gears	W. H. Miner, Inc.	2,893,571	7/ 7/59
Tire casings	Compagnie Generale des Establissements Michelin	2,894,555	7/14/59
Rubbery diene synthetic elastomer	Diamond Alkali Co.	2,894,926	7/14/59
Rubbery compositions reinforced with fibrous silicon dioxide	The B. F. Goodrich Co.	2,894,929	7/14/59

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.



Ameripol Rubber colors kitchens at a profit

These attractive housewares are made of Ameripol Rubber—a type that is supplied in such uniform light color that the manufacturer saves substantially by reducing the need for adding expensive pigments.

The Ideal Rubber Products Company, Brooklyn 7, New York, chooses Ameripol 1708 to meet its strict requirements for uniformity in color and physicals from shipment to shipment. Also, Ideal reports this polymer simplifies their compounding and molding operations.

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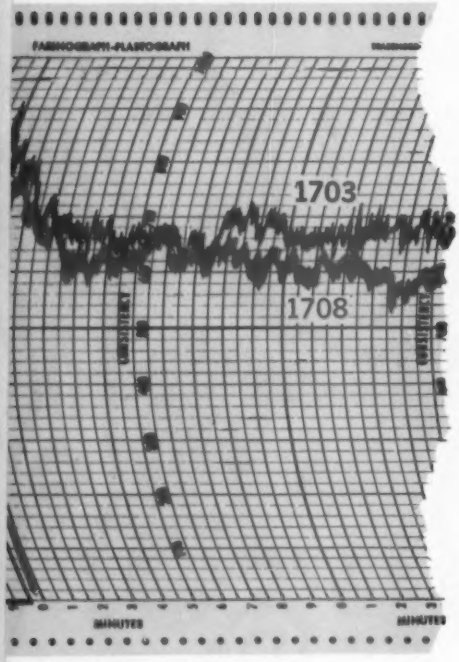


HIGHER-OIL
AMERIPOL 1708
EASIER TO PROCESS
Plastograph Comparison

One of the most widely used oil-extended SBR rubbers is 1703. Thus this polymer was selected as a "control" in laboratory tests to determine the advisability of switching to lower-cost Ameripol 1708, a higher-oil-level counterpart of 1703, in typical compounds. Comparative tests show that you can switch to Ameripol 1708 and obtain much the same physicals (improved in some respects). The tests were made in Goodrich-Gulf's Sales Service Laboratory on a typical low cost mat compound. The data here may help guide you to a substantial cost reduction. Ask your Goodrich-Gulf sales representative for complete information.

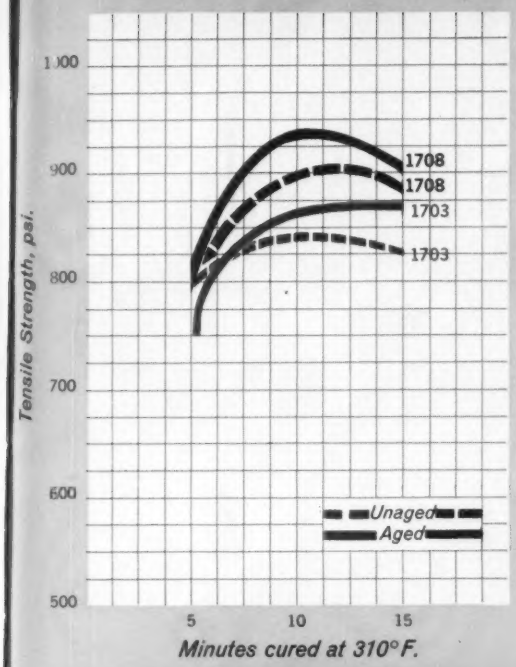
RECIPES USED FOR COMPARISON OF 1708 AND 1703

The two polymers 1703 and 1708 were substituted for each other, part for part, in the typical low cost mat recipe given below. All other ingredients were held constant.

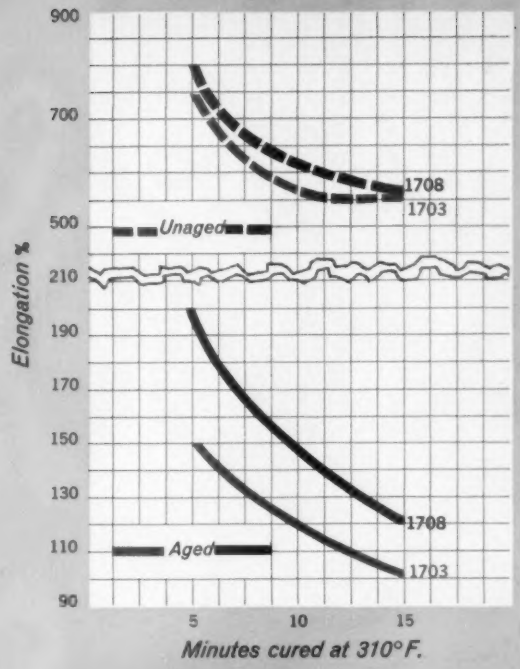
The compounded stocks were tested for Mooney scorch at 280°F and the cured compounds (5, 10 and 15 min. at 310°F for tensile, elongation, 100% and 200% modulus and hardness.

	1703	1708
Polymer	100	100
Zinc Oxide	5	5
Stearic Acid	1	1
Sunproof Wax	2	2
Cumar MH 2½	10	10
Circolite Oil	10	10
Clay	150	150
Whiting	150	150
Titanium Dioxide	5	5
Benzothiazyldisulfide	2	2
DPG	1	1
Sulfur	4	4
	440	440

Ameripol
THE PREFERRED RUBBER



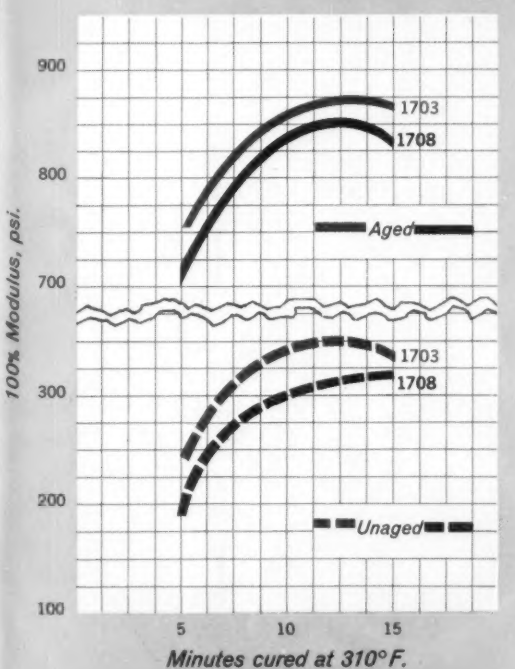
TENSILE STRENGTH



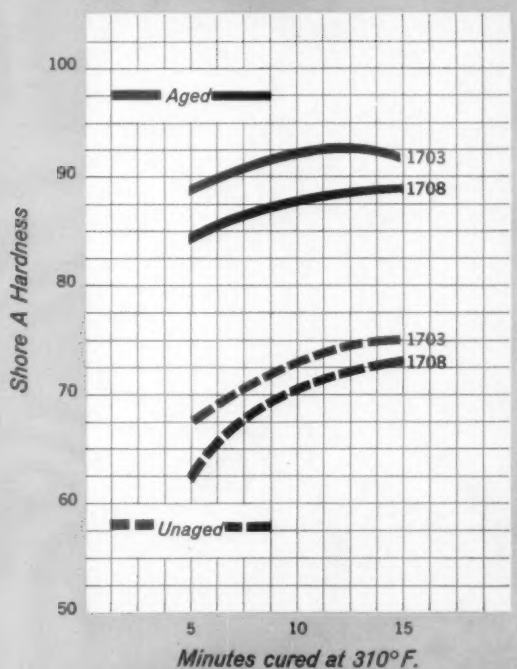
ELONGATION

Comparative tests prove performance of **AMERIPOL 1708**

MODULUS



HARDNESS



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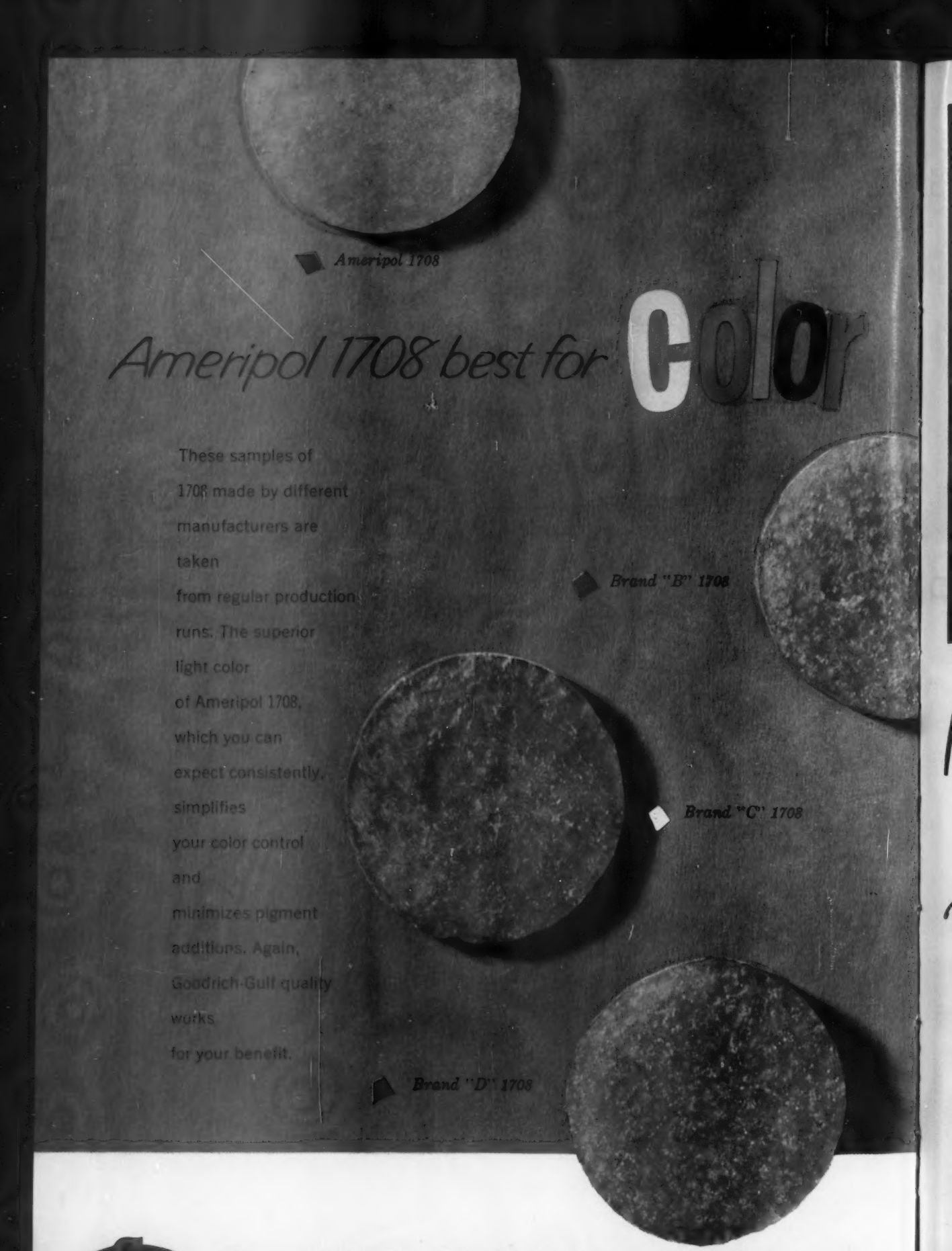
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Ameripol 1708 best for color
These samples of 1708 made by different manufacturers are taken from regular production runs. The superior light color of Ameripol 1708, which you can expect consistently, simplifies your color control and minimizes pigment additions. Again, Goodrich-Gulf quality works for your benefit.
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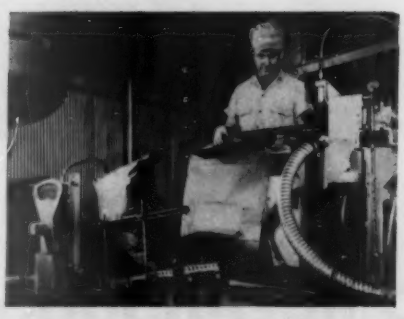
Only Witco-Continental gives carbon blacks such kid-glove treatment in packaging and shipping. There's no compromise on quality and no compromise on service. Facilities are maintained in every sales office city for ex-warehouse customers. For outstanding service and personalized attention on all your carbon black orders...be sure to specify WITCO-CONTINENTAL.

There's less chance of shipping delay with Witco-Continental carbon blacks. We print your purchase order number, code or pigment number, type of black and other information, on every bag. Result is easier inventory, checking and handling.

Improved packing and better palletizing are achieved through specially built bag-shaping machines. You choose the type of bag you want.

Valve bags mean better unit loading, cleaner warehousing, faster and easier handling. Witco-Continental's exclusive patented valve filling machines insure greater uniformity of outside bag dimensions.



When carbon blacks leave Witco-Continental plants, you can be sure they're in good condition. We photograph each shipment after loading as a check on correct and damage-free stacking. These photographs, with specially designed loading diagrams attached, are then sent to you as *your* check on shipping conditions.

WITH CARE BY WITCO-CONTINENTAL

Special car liners prevent interlocking of bags and protect them from each other and from the sides of cars or trailers. Convenient disposable pallets facilitate handling, yet eliminate storage or return costs.

If you prefer shipment by hopper car, Witco-Continental traffic control system means that you can get same-day information on the whereabouts of your shipment from your *local* sales office. There are 113 carefully maintained hopper cars ready to serve you.

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CONTINENTAL CARBON COMPANY

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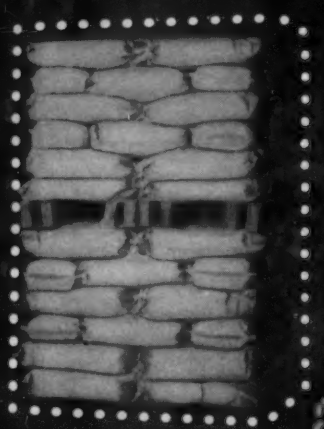
PROTOX®-267

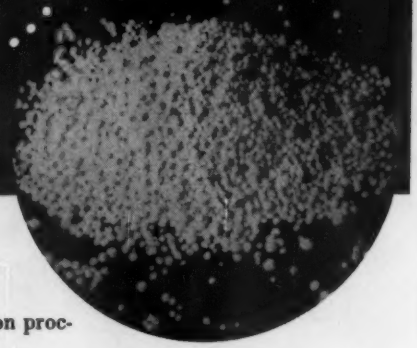
ZINC OXIDE

Two units on left contain 84 bags
2.1 tons conventional zinc oxide.
(Each unit 6 bags per layer, 7 layers high.)

Two units on right contain 96 bags
2.4 tons Protox-267 zinc oxide.
(Each unit 8 bags per layer, 6 layers high.)



It's pelleted!



It saves dollars!

You will save on unloading costs. You will save on storage costs. You will save on processing costs.

PROTOX-267 bulks about half that of conventional zinc oxides. A 50-pound bag occupies less than 1 cubic foot of space. It flows freely . . . can be weighed out faster. Long before the pigment enters your processing operation you can start counting your savings.

But the most important savings come from PROTOX-267's faster incorporation and dispersion in rubber. The unique coating* of zinc propionate on the pigment particles makes for rapid and thorough dispersion. There are no aggregates . . . no undispersed pigment . . . no spotty cures.

And keep in mind . . . PROTOX-267 is a member of the HORSE HEAD line of zinc oxides. That also makes it the *most uniform* zinc oxide you can buy.

Do you have the 24-page booklet on PROTOX zinc oxides? It's chock-full of facts every rubber chemist and purchasing agent should know. A post card will bring you a copy.

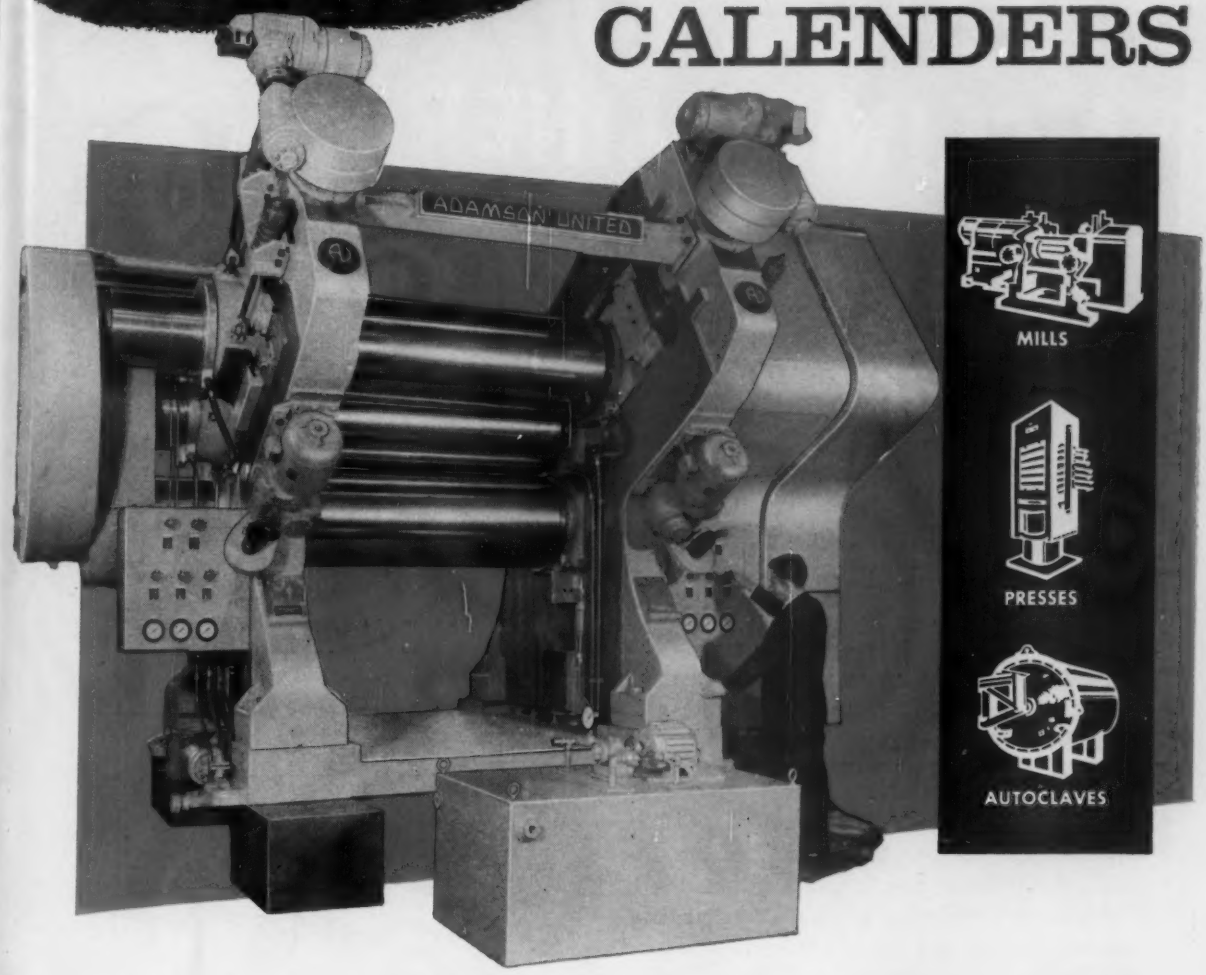
U.S. Patent 2,303,330

THE NEW JERSEY ZINC COMPANY

160 Front Street • New York 38, N. Y.

ADAMSON UNITED

PRECISION CALENDERS



Whether the project calls for supplying all mills, calenders, presses and associated machinery for a completely new and modern rubber or plastics plant, or a single unit for a new process, you'll find Adamson United equipment offers the most efficient design and up-to-date operating features for today's production requirements. Our full line of modern rubber and plastics calendering equipment is an outstanding example.

Adamson calenders are skillfully engineered for production of close tolerance, high quality material at high speed. Standard sizes range from 8" x 16" laboratory models to large production units with rolls measuring 36" x 92". Various types include 2, 3 and 4 rolls; vertical, 120 degree, inverted-L, Z-type, cascade, inclined and others. The unit illustrated is a 3-roll, 120-degree, connecting gear-type calender equipped with roll crossing. Adamson calenders are also available with such precision operating features as roll bending, zero clearance, flood lubrication, drilled rolls, anti-friction bearings and pinion-stand drive.

With a complete line of accessory equipment for continuous processing, Adamson United is prepared to handle any rubber or plastics calendering problem you may have. Our engineering staff is at your service — to recommend the unit best suited to your needs, or to develop special equipment to meet your specific requirements. Write or call for complete details — without obligation.

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730 CARROLL STREET, AKRON 4, OHIO

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Plants at Pittsburgh, Vandergrift, Wilmington, Youngstown, Canton

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Climco Liners last longer because of their non-sticking quality, increased tensile strength and lasting flexibility.

In addition to reducing fabric purchases, Climco Liners also cut production costs — because they separate perfectly from the stock, down-time due to stock adhesions is eliminated. Tackiness of the stock is preserved, gauges are more easily maintained and latitude in compounding is enlarged. There is no lint or ravelings with Climco Liners and they can be stored horizontally if desired.

Since 1922 Climco Processed Liners have proved their worth to the rubber industry. Give them a trial in your plant.

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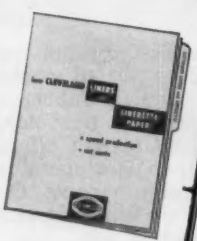
5508 Maurice Ave. • Cleveland 27, Ohio, U.S.A.
Cable Address: **"BLUELINER"**

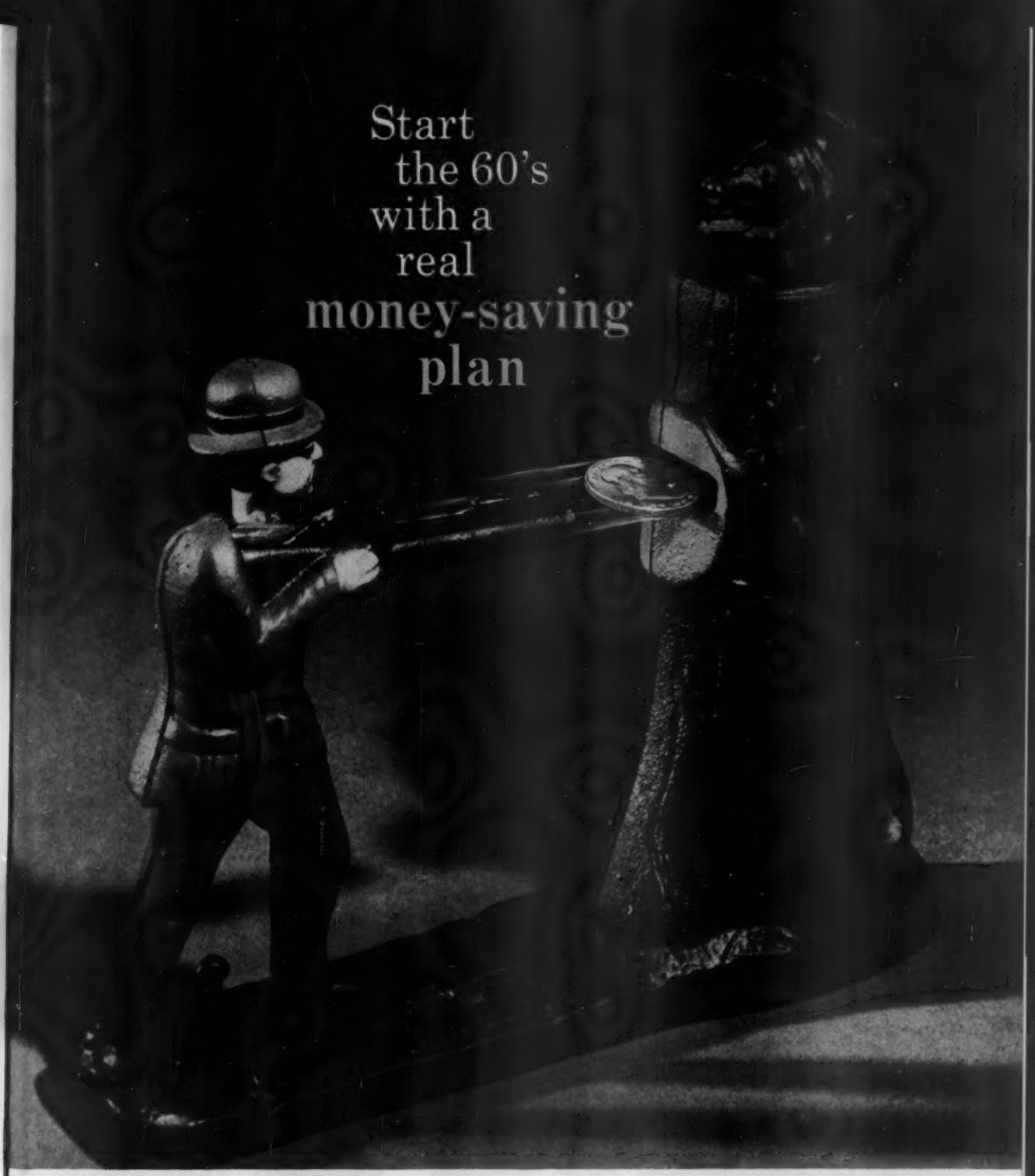


ILLUSTRATED LINER BOOKLET

Tells all about Climco Liners and Linerette and how to get better service from liners. Write for your copy now.

LINERETTE INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

CLIMCO
PROCESSED LINERS
Serving the Industry Since 1921



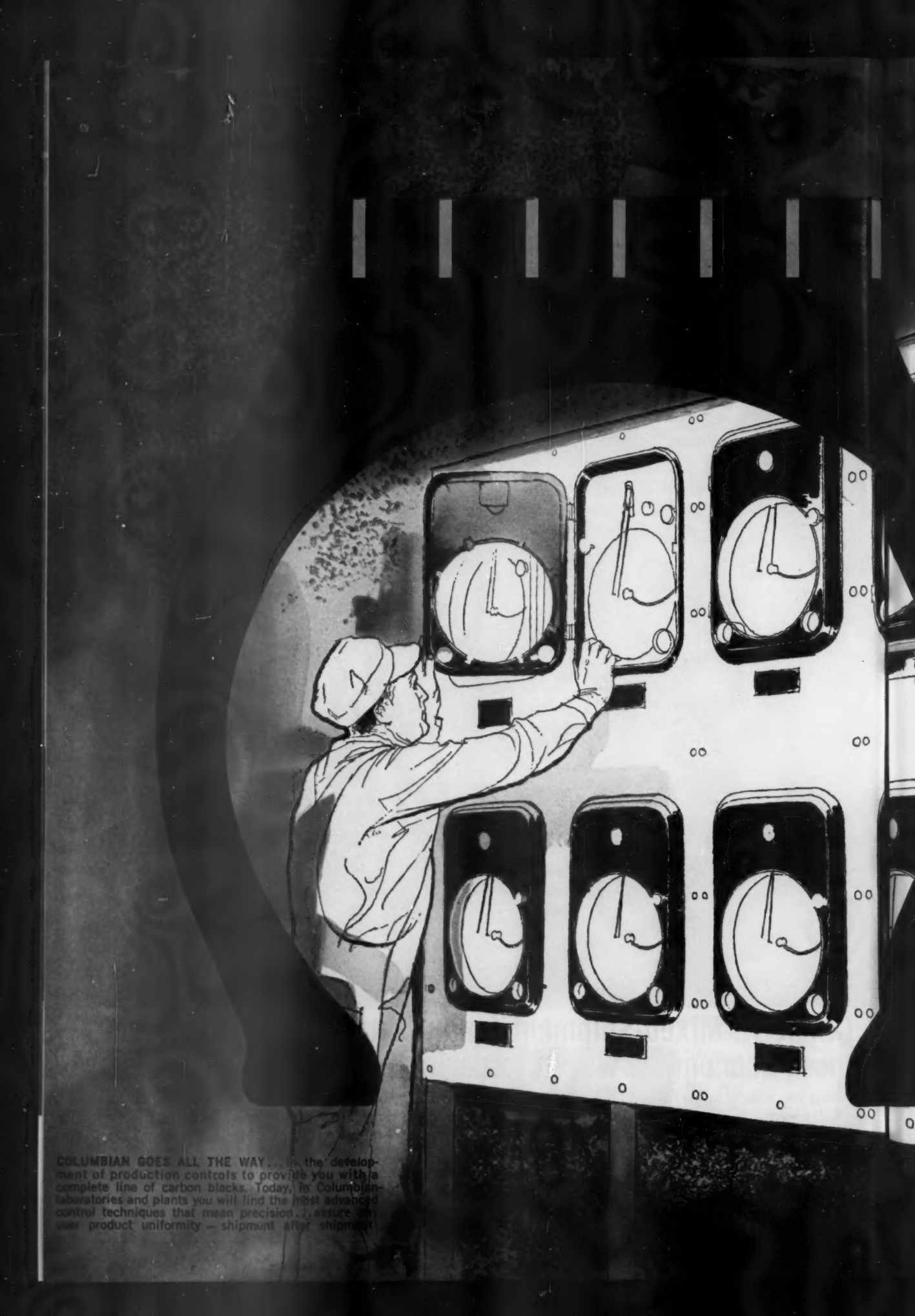
Cabot's "Mixed-Shipment" plan is the most convenient, most economical way to order carbon black ever devised

Sound like exaggeration? It isn't. Here's how you save with Cabot's cost-cutting "mixed-shipment" plan: 1 By buying in mixed carloads or truckloads, you pay only economical carload prices 2 You pay lowest possible freight rates 3 You maintain better inventory control – purchases can be planned more economically, with no oversized inventories required. And there's still another important benefit: optimum flexibility. Cabot makes more different grades of carbon black than anyone in the world. For this reason, Cabot can offer you the widest variety of money-saving combinations from which to choose. Your Cabot representative can work out a plan customized to your requirements.

Why not call him today?

CABOT **GODFREY L. CABOT, INC.**

125 HIGH STREET, BOSTON 10, MASSACHUSETTS



COLUMBIAN GOES ALL THE WAY... in the development of production controls to provide you with a complete line of carbon blacks. Today, in Columbian laboratories and plants you will find the most advanced control techniques that mean precision... assure uniform product uniformity — shipment after shipment!

COLUMBIAN...

precise production every step of the way!

Product performance is the *proof* that Columbian's precise production methods are outstanding... provide carbon blacks that meet your most rigid requirements. Every Columbian black is produced under the most exacting production controls ...to deliver the utmost in quality...to perform flawlessly *every step of the way.* Get the complete story...today!

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STATEX 125 ISAF Intermediate Super Abrasion Furnace
STATEX R HAF High Abrasion Furnace
STANDARD MICRONEX® MPC Medium Processing Channel
MICRONEX W6 EPC Easy Processing Channel
STATEX B FF Fine Furnace
STATEX M FEF Fast Extruding Furnace
STATEX 93 HMF High Modulus Furnace
STATEX G GPF General Purpose Furnace
FURNEX® SRF Semi-Reinforcing Furnace

AUTOMATION IN ACTION—Mammoth production requirements are met by this giant automated press which was developed by the Erie Foundry Company of Erie, Pennsylvania. It is equipped to turn out 1200 forgings an hour, requires only a single operator, and can outproduce a crew operating a hand-fed unit two or three times. Designed for the high volume forging of such parts as connecting rods, gear blanks, auto and tractor valves, stem pinions, ring gears, track links and wheel hubs, this masterpiece of engineering has a capacity of 2500 tons and weighs about 320,000 pounds. It swings into action when driven by this efficient Poly-V®M Section belt powered by a 250 H.P. motor. The belt, 18" wide (48 ribs), 301" long, was made by Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, New Jersey, employing Mount Vernon fabrics.

This is another example of how fabrics made by Mount Vernon Mills, Inc., and the industries they serve, are serving America. Mount Vernon engineers and its laboratory facilities are available to help you in the development of any new fabric or in the application of those already available.

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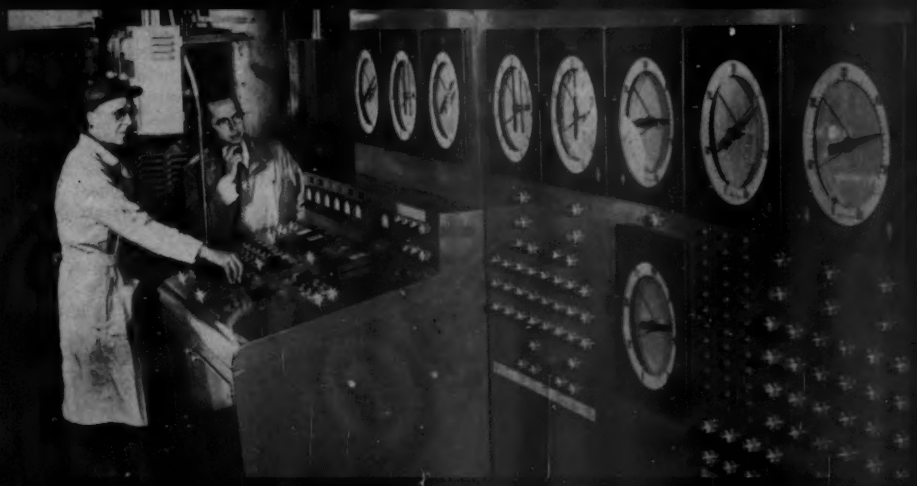
START UP . . . moment of truth



Control-Center — Calendar Treating Line Photo courtesy Armstrong Rubber Manufacturing Co.

Whether the simplest kind of equipment installation — or the world's first triple-zone rayon/nylon calendar line as shown here — the moment of startup is the culmination of months of calculation and construction . . . an inexorable test of soundness of engineering, skill of manufacture and field erection.

This unique new process line — highly advanced in operation and control — performed at startup, and after a brief two-week testing and minor adjustment period exploring the multiple operating possibilities, went into full-time production at 60 ypm.

Achieving anticipated operating results from the moment of startup is the rule with Litzler fabric treating lines and units. "Our plant engineer reports that the unit has operated very satisfactorily since the time of its installation"* . . . and "Having completed the installation of the subject machine, we want to express our satisfaction at the way it is working and at first results"* . . . are typical judgements of owners.

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coming events

Jan. 20. Southern Ohio Rubber Group, Technical Meeting, Engineers Club, Dayton, Ohio.

Jan. 21. National Bureau of Standards, Division of Organic and Fibrous Materials, Lecture Series on High Polymers, Materials Testing Laboratory, Washington, D. C.

Jan. 21. Quebec Rubber & Plastics Group, Joint Technical Meeting with the Society of Plastics Engineers, Ruby Foo's Restaurant, Montreal, Quebec, Canada.

Jan. 22. Philadelphia Rubber Group, Technical Meeting, Poor Richard Club, Philadelphia, Penna.

Jan. 25-28. Plant Maintenance & Engineering Show, Convention Hall, Philadelphia, Penna.

Jan. 25-28. Thirteenth International Symposium on Modern Methods in Analytical Chemistry, Coates Chemical Laboratories, Louisiana State University, Baton Rouge, La.

Jan. 27. Second Annual Symposium on High Speed Testing, Sponsored by Plas-Tech Equipment Corp., Somerset Hotel, Boston, Mass.

Jan. 28-29. American Rocket Society, Solid Propellants Conference, Princeton University, Princeton, N. J.

Jan. 29. Akron Rubber Group, Technical Symposium, Sheraton Hotel, Akron, Ohio.

Jan. 29. Chicago Rubber Group, Technical Meeting, Furniture Club, Chicago, Ill.

Jan. 30-Feb. 3. National Automobile Dealers Association, 43rd Annual Convention, Sheraton Park Hotel, Washington, D.C.

Feb. 1-5. American Society for Testing Materials, Committee Week, Hotel Sherman, Chicago, Ill.

Feb. 1-5. Instrument Society of America, Instrument and Automation Conference and Exhibit, Sam Houston Coliseum, Houston, Texas.

Feb. 2. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Feb. 2-4. Society of the Plastics Industry, 15th Reinforced Plastics Division Conference, Edgewater Beach Hotel, Chicago, Ill.

Feb. 4-6. American Society for Metals, Metals Conference, Fairmount Hotel, San Francisco, Calif.

Feb. 5. Akron Polymer Lecture Group, University of Akron, Akron, Ohio.

Feb. 5-7. Boston Rubber Group, Ski Weekend, Bartlett Hotel, Bartlett, N. H.

Feb. 9. Association of Consulting Chemists & Chemical Engineers, Luncheon Meeting, Hotel Shelburne, New York, N. Y.

Feb. 9. Washington Rubber Group, Technical Meeting, Department of Commerce Auditorium, Washington, D. C.

Feb. 11. Fort Wayne Rubber & Plastics Group, Technical Meeting, Van Orman Hotel, Fort Wayne, Ind.

Feb. 12-13. Southern Rubber Group, Technical Meeting, Shamrock Hilton Hotel, Houston, Texas.

Feb. 14-18. Hobby Industry Association, American Trade Show & Convention, Sherman Hotel, Chicago, Ill.

Feb. 17. Southern Ohio Rubber Group, Plant Tour, Modern Industrial Plastics, Dayton, Ohio.

Feb. 18-19. American Society for Quality Control, Textile Division, Annual Conference, Clemson House, Clemson, S. C.

Feb. 19. Connecticut Rubber Group, Technical Symposium, Waverly Inn, Cheshire, Conn.

Feb. 21-24. American Institute of Chemical Engineers, National Meeting, Biltmore Hotel, Atlanta, Ga.

Feb. 25. National Bureau of Standards, Division of Organic and Fibrous Materials, Lecture Series on High Polymers, Materials Testing Laboratory, Washington, D. C.

Feb. 26. Quebec Rubber & Plastics Group, Ladies' Night Dance, Victoria Hall, Montreal, Quebec, Canada.

Feb. 29-March 4. Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy & Exposition of Modern Laboratory Equipment, Penn - Sheraton Hotel, Pittsburgh, Penna.

March 1. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

March 4. Akron Polymer Lecture Group, University of Akron, Akron, Ohio.

March 6-11. Tenth International Toy & Trade Fair, Hotel Statler Hilton, New York, N. Y.

March 7-16. American Toy Fair, Hotels New Yorker and Sheraton-Atlantic, New York, N. Y.

March 9-11. Instrument Society of America, Temperature Measurement Symposium, Deshler-Hilton Hotel, Columbus, Ohio.

March 10-13. Pacific Automotive Show, City Auditorium, Denver, Colo.

March 11. Chicago Rubber Group, Technical Meeting, Furniture Club, Chicago, Ill.

March 14-18. National Association of Corrosion Engineers, National Meeting, Dallas, Texas.

March 17. National Bureau of Standards, Division of Organic and Fibrous Materials, Lecture Series on High Polymers, Materials Testing Laboratory, Washington, D. C.

March 17. Quebec Rubber & Plastics Group, Technical Meeting, Queen's Hotel, Montreal, Quebec, Canada.

March 18. Boston Rubber Group, Technical Meeting, Somerset Hotel, Boston, Mass.

March 24-25. Textile Research Institute, Annual Meeting, Hotel Commodore, New York, N. Y.

March 25. New York Rubber Group, Spring Meeting, Henry Hudson Hotel, New York, N. Y.

March 29-31. American Society of Mechanical Engineers, American Power Conference, Sherman Hotel, Chicago, Ill.

March 30-31. Plastics Institute Conference on Polymeric Progress, William Beveridge Hall, London University, London, England.

March 30-April 1. Canadian Tire Dealers Association, Annual Meeting, Montreal, Quebec, Canada.

April 1. Akron Polymer Lecture Group, University of Akron, Akron, Ohio.

April 3-6. National Toy Show, Morrison Hotel, Chicago, Ill.

April 3-8. Sixth Nuclear Congress & Exhibit, New York Coliseum, New York, N. Y.

April 5-14. American Chemical Society, 137th National Meeting, Cleveland, Ohio.

April 7. Rhode Island Rubber Club, Spring Meeting, Pawtucket Country Club, Pawtucket, R. I.

April 8. Akron Rubber Group, Technical Symposium, Sheraton Hotel, Akron, Ohio.

April 8-9. Society of the Plastics Industry, 17th Western Section Conference, New Riviera Hotel, Palm Springs, Calif.

April 9-26. Fourth Osaka International Trade Fair, Osaka, Japan.

April 14. Fort Wayne Rubber & Plastics Group, Technical Meeting, Van Orman Hotel, Fort Wayne, Ind.

April 18-19. Conference on Automatic Techniques, Sheraton Cleveland Hotel, Cleveland, Ohio.

April 19. Association of Consulting Chemists & Chemical Engineers, Forum Meeting, Hotel Shelburne, New York, N. Y.

April 20. Quebec Rubber & Plastics Group, Technical Meeting, Queen's Hotel, Montreal, Quebec, Canada.

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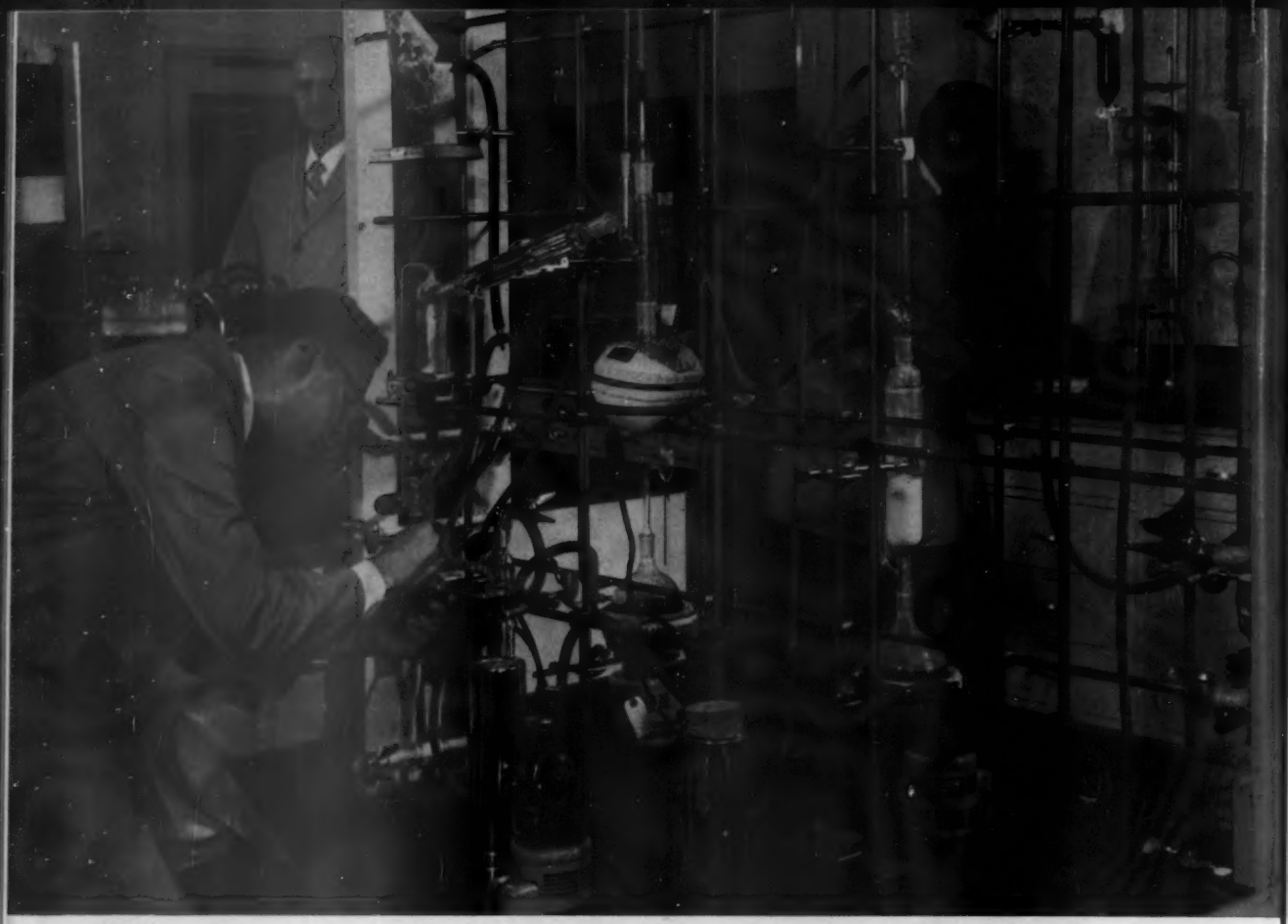


Shown here is one of 13 completely equipped new laboratory units which Neville has recently built as part of a move to bolster basic research. New products are born here—old ones improved.

New Neville Research And Service Facilities Mean Better Products For You

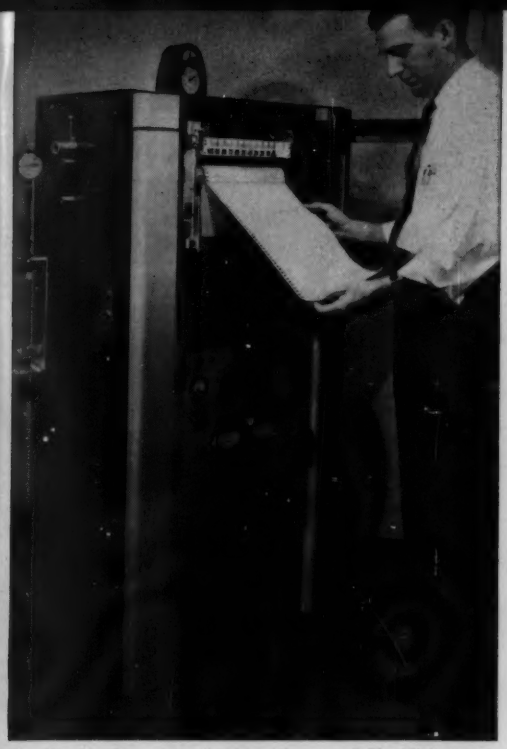
When Neville Chemical Company built its unique office building and research center on Neville Island in Pittsburgh, it did so with its customers in mind. It placed all research, technical service, general administration, sales and even a pilot plant under one roof for quick communications and good coordination. This adds up to better and faster service for you.

Technical facilities were greatly enlarged and divided into four basic sections . . . Technical Service, Research, Process Development and Laboratory Service. In the last three departments, Neville scientists and technicians are constantly striving to find new polymers and chemicals to increase the ability of Neville products to improve those of its customers. In addition, these departments are concerned with the development of new processes, pilot plant studies and analytical research. Through the efforts of this group, Neville developed the country's first commercial process for the production of high purity Indene and Indene derivatives.

The Technical Service Department spends a large measure of its time in technical assistance to our customers. Whether their products are rubber goods, coatings, floor materials, adhesives or any other, Neville studies them for application with our products and for possible improvement. The people in Technical Service pride themselves on often solving problems before customers are aware of their existence.

Neville's thirteen completely new and modern laboratory units function alike for basic research, process development, technical service, laboratory service, and isolating new chemicals or polymers. The laboratories are arranged in a continuous double line with the advanced design pilot plant at the end. Thus, when new polymers have been discovered and studied, they subsequently proceed from one step to the next and continue down the hall to the pilot plant where the commercial feasibility of manufacture is established. In addition to this, the Quality Control Laboratories, which maintain separate quarters in the plant, are constantly at work checking to be certain that every Neville product will conform accurately to specifications.

Much of the benefit of Neville's new facilities could not be readily translated into customer profit were it not for the work of the technical representatives. These highly trained men act as liaison between your plant and the new Neville Island Center. You will find it pays to ask a member of this technical service staff to visit you and bring your formulation problem back to the laboratories for solution.



In the basic research department of Neville's new center, scientist takes a reading from a new Chromatograph to separate and determine chemical components. Not shown is an advanced new infra-red spectrophotometer for even closer identification.

In a room with specially controlled humidity and temperature, an Instron Testing Machine determines the tensile, modulus, elongation and flexual strengths of basic materials from 4 lb. to 10,000 lb. load.

Key men in translating Neville's new facilities to better service are its corps of technical representatives. One member of this highly-trained field staff is shown here assisting a customer.

Under constant use at Neville is a Weather-O-Meter in which samples of rubber goods, coatings and many other products undergo aging under accelerated weather conditions.

Resins — Coumarone-Indene, Heat Reactive, Phenol Modified Coumarone-Indene, Petroleum, Styrenated, Alkylated Phenol • **Oils** — Shingle Stain, Neutral, Plasticizing, Rubber Reclaiming • **Solvents** — 2-50-W Hi-Flash*, Wire Enamel Thinners, Nevsolv* • **High Purity Indene.**

*Trade Name

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good reasons for buying ASRC quality polymers

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When you buy ASRC polymers, you get full assurance of the same high quality from shipment to shipment.

2 **EASE OF PROCESSING**

You get easier, smoother, more rapid processing with all ASRC polymers. You benefit from lower power costs, superior physical properties.

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Situated at the "hub" of the rubber market, ASRC is within overnight trucking distance of most key points.

4 **FAST SERVICE**

Shipments are expedited at ASRC through prompt, personal attention to your orders. Faster delivery can be assured by placing your orders by telephone, telegram or teletype.

It Pays to Rely on ASRC

Current Polymers

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ASRC 1500	Staining
ASRC 1502	Non-Staining
ASRC 1503	Non-Staining
ASRC 1507	Non-Staining
ASRC 3105	Non-Staining
ASRC 3106	Non-Staining
ASRC 3110	Non-Staining
COLD OIL	
ASRC 1703	Non-Staining
ASRC 1708	Non-Staining
ASRC 1712	Staining
ASRC 1713	Non-Staining
HOT	
ASRC 1004	Staining
ASRC 1006	Non-Staining
ASRC 1009	Non-Staining
ASRC 1018	Non-Staining
ASRC 1019	Non-Staining
ASRC 3014	Non-Staining

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SYNPOL synthetic rubber, made by TEXUS, fits all kinds of footwear needs—inside and out ...*indoors* and out. And it also fits many footwear manufacturing needs, such as the need to *keep costs down*. And the need for lighter, brighter footwear colors to blaze the way to 1960 market leadership. For this, TEXUS makes the lightest, whitest synthetic rubber grades to meet your requirements.

Most important, SYNPOL fits the vital need for *top quality*. Specifying uniform and rigidly tested SYNPOL is like taking out an insurance policy... that your footwear will stand up anywhere as highest quality merchandise! Send *now* for complete technical information.

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WHICH SYNPOL FITS YOUR NEED?		
HOT-TYPE POLYMERS	1006 1061 1009	These original SBRs give easy processability, are exceptionally light colored.
COLD TYPE	1502 1551	For manufacturers who require the special properties and quality offered by cold-type polymers.
COLD OIL-EXTENDED POLYMERS	1703† 1707* 1708* 8200* 8201**	Offers the superior properties of cold polymers at substantial economy.

Varying degrees of oil extension—†25 parts, *37.5 parts, **50 parts

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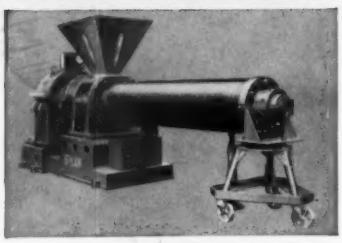

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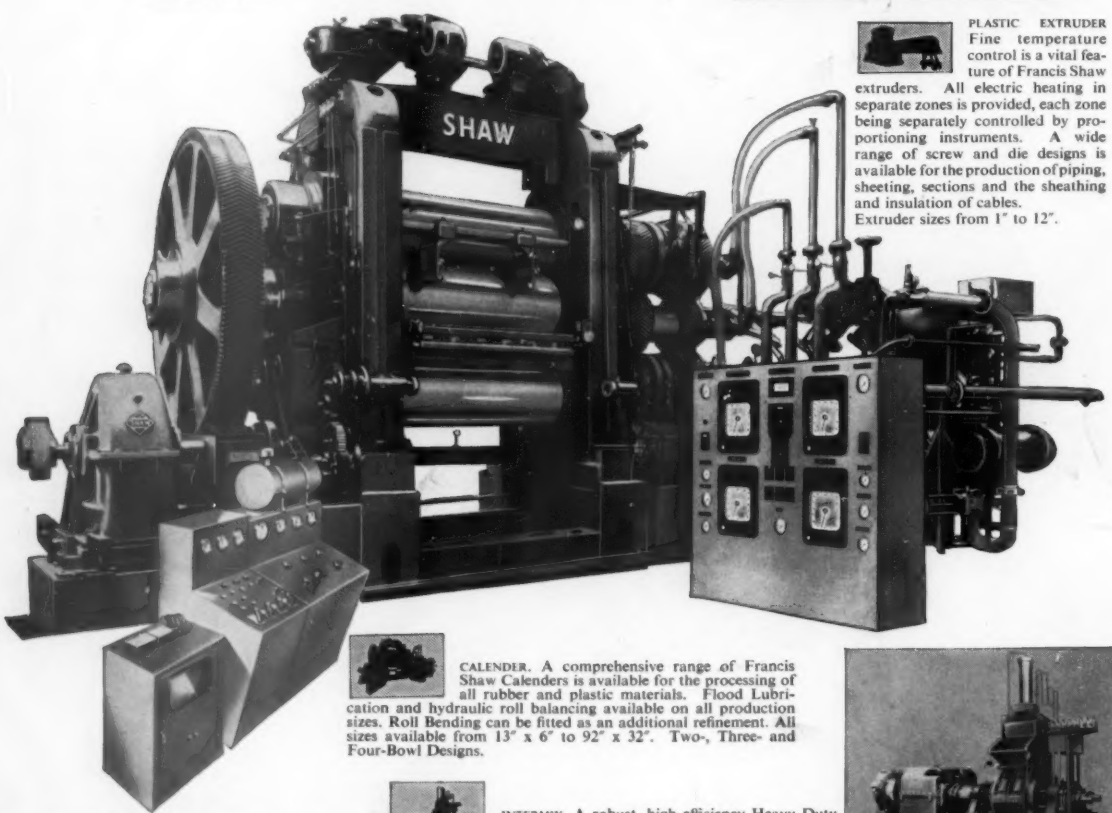

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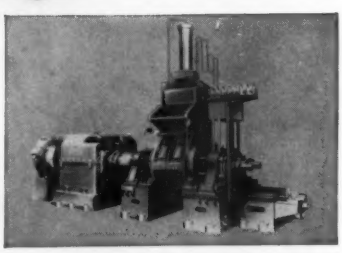

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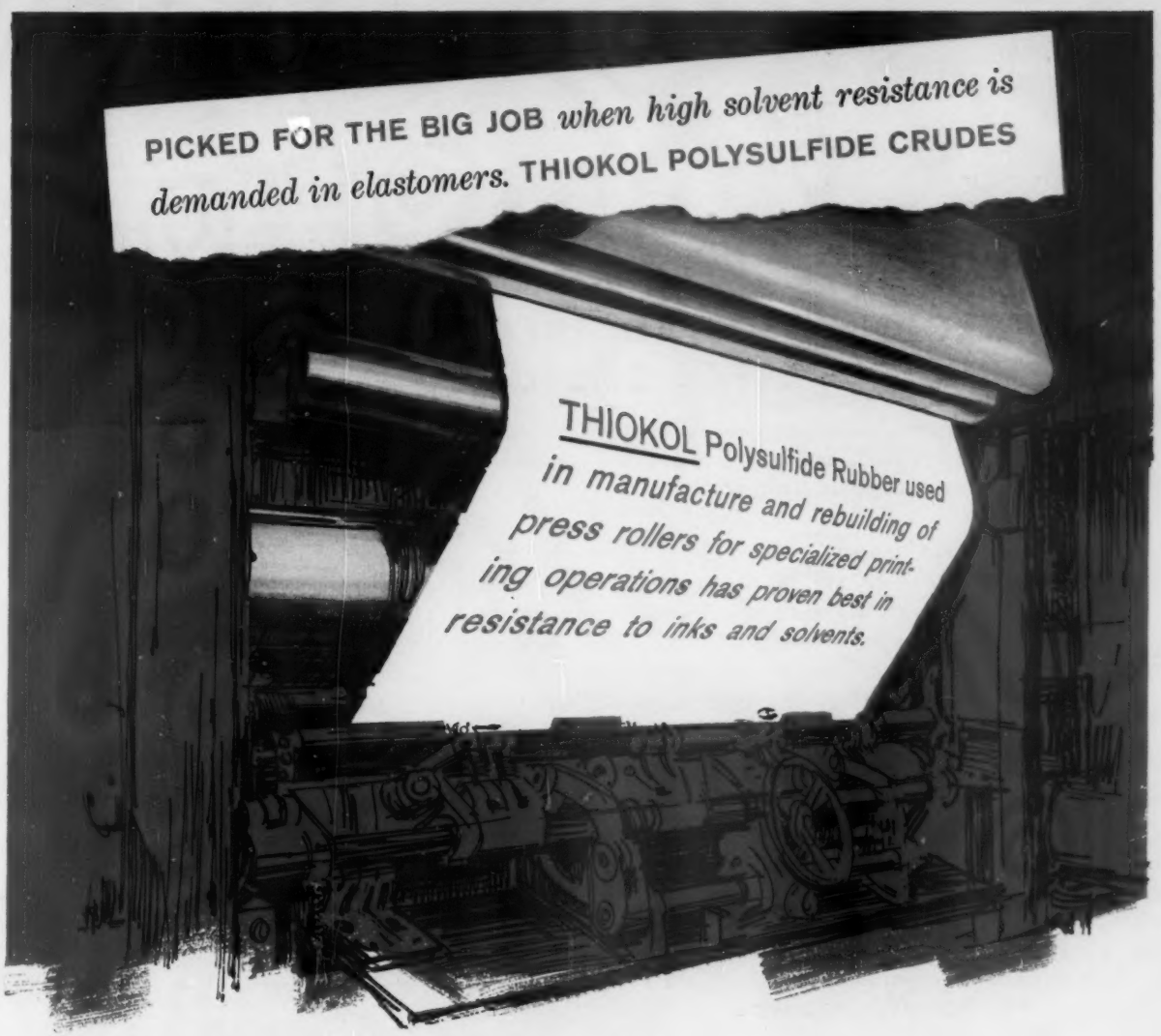
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News in Brief

► A four-page bulletin describing the process by which high frequency sound waves impart intense scrubbing action to solutions to speed precision cleaning, has been released by Oakite Products, Inc., New York, N. Y. Ask for Service Bulletin No. 16A.

► Stewart Bolling & Co., Inc., Cleveland, Ohio, reports that it is developing a line of plastic extruders with electrically heated barrels which have exceptional temperature control features obtained from heating elements of unique design.

► Union Carbide Consumer Products Co., a division of Union Carbide Corp., New York, N. Y., is marketing a rubber lubricant which is designed to make some of the nastiest jobs in service stations and garages easier and faster. The lubricant, called Prestone Rubber Lubricant, penetrates dirt and removes squeaks in rubber bushings.

► Availability of several additional types of packing has been announced by Fibrous Products Division of Union Asbestos & Rubber Co., Bloomington, Ill. The new packings include: interlocking braided asbestos; cotton, jute and ramie; flax; and a broadened line of duck and rubber.

► Kaumagraph Co. has moved its New York office to 5106 Empire State Building, 350 Fifth Avenue, New York, N. Y.

► A six-page, two-color brochure on the uses of carbon dioxide for low temperature environmental testing, has been issued by the Pure Carbonic Co., a division of Air Reduction Co., New York, N. Y. The brochure describes, with photographs and diagrams, the four principal methods used in industry today. Specify form ADPC 44.

► Product and application data on the complete family of RTV silicone rubber compounds is available in a 12-page bulletin published by the Silicone Products Department, General Electric Co., Waterford, N. Y. The bulletin, designated CDS-170A, contains up-to-date information on product properties and data for RTV compounds 20, 40, 60, 90 and new silicone rubber sponge.

► The 1959-1960 edition of "Products of The Dow Chemical Company" has recently been issued. This 44-page compilation lists the properties and uses of some 375 industrial, pharmaceutical, and agricultural chemicals currently produced by Dow. In addition, the catalog features an expanded section on plastics and coating products. Copies are available from Dow Chemical Co., Midland, Mich.

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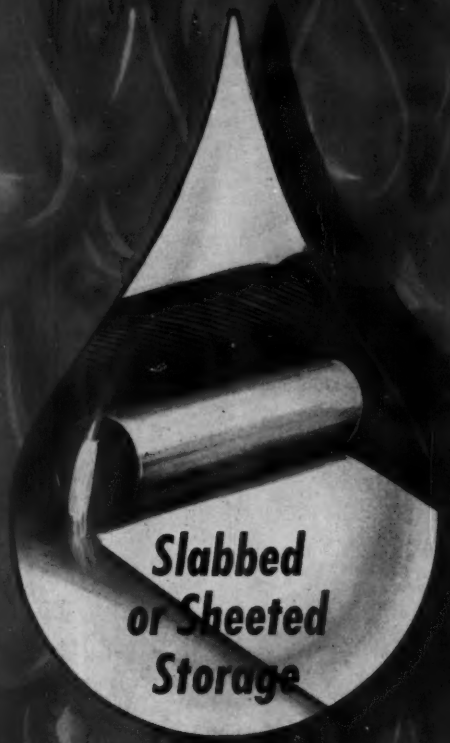

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Although it has been obvious in recent years that Soviet rubber technology and research is very vigorous and highly advanced, it has been extremely difficult because of the language barrier for those in Western countries to follow the technical progress being made there. This, in spite of the fact that the Russian rubber journal is a prolific source of original literature on the subject.

Now, however, through the cooperation of the British Government and the Research Association of British Rubber Manufacturers, cover-to-cover translations of "Kauchuk i Rezina," the Russian rubber journal, are available on every single issue.

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Ways of effecting further economies in the construction of plant for the synthesis of raw rubber and other organic compounds.
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Two-stage method of preparing homogeneous rubber-reclaim stocks in a rapid mixer.
Electron-microscope study of rubber stocks and their main constituents.
Synthesis of trans-1, 4-polyisoprene.
Action of ionizing radiation on cable rubbers.
Properties of stocks and vulcanizates based on brominated butyl rubber.
The compatibility of polyisoprene with other types of rubber and the effect of this compatibility on bond strength.
Efficiency of the zinc salt and disulfide of trichlorthiophenol in reclaiming rubbers by the neutral method.
Low-temperature copolymers of butadiene—1,3 and 2—methyl—5—vinylpyridine as general purpose rubbers.
Preparation of vulcanization accelerators in pellet form.

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As Soule Sees It...

by Kenneth J. Soule

Diamonds Everyone?

The recent announcement by the General Electric Co. that they are in large scale commercial production of artificial diamonds was widely reported in all sorts of news media. These included technical magazines, semi-scientific journals, various trade periodicals, and the daily newspapers.

Disclosure was also made of the process involved, which up to this time has been kept secret by United States Government request. The method employed consists of heating, under high pressure, some form of carbon sandwiched between layers of a metal catalyst and contained in a pyrophyllite capsule. The preferred carbon is graphite, although carbon blacks, sugar, charcoal, or a carburizing compound may be used. For the metal catalyst any one of eleven metals is satisfactory. These are chromium, cobalt, iridium, iron, manganese, nickel, osmium, palladium, platinum, rhodium and ruthenium.

The heat required, 2200° to 4400°F., is obtained by passing an electric current through the capsule assembly, which at the same time is being subjected to a hydraulic pressure of between 800,000 and 1,800,000 pounds per square inch, Diamond production takes place within a matter of a few minutes. The diamonds produced are generally very small, about 1/10 of a carat in weight, which puts them in the microscopic class. However, this size is excellent for use in grinding and polishing wheels used widely in industry. Since the artificial stones are in general superior to natural diamonds previously employed, they will find a wide market, even at a price of about $6500 per pound (approximately the same figure, incidentally, as that charged for the natural variety.)

As far as the United States makers of industrial grinding and cutting wheels are concerned, the great news implicit in the G-E achievement is two-fold; first, the fear of being cut off from the vitally important European source of industrial diamonds by war or other catastrophe is gone forever and second, the De Beers Consolidated Mines monopoly on industrial diamonds appears ended. No longer will it be necessary for grinding wheel manufacturers to travel to Europe, hat in hand, virtually begging for the stones with which to make their important product.

There is also one other angle to the G-E synthetic diamond story which may rise up to plague some of you men with acquisitive or demanding wives or sweethearts. It is widely stated that "diamonds are a girl's best friend." This may or may not be true, but in any case, many of the ladies (bless 'em), seem to think that the trinkets are rather nice to have around.

Now, let's assume your particular girl friend reads a short news note that the long-standing monopoly of natural diamond supplies has been *shattered* by the spectacular discovery of a way to make artificial diamonds in quantity—equal to and in many ways better than the naturally mined type. What happens? . . . She at once leaps to the conclusion that the new diamonds will be a great deal cheaper than the old ones, and therefore, you can now surely afford to buy her a Queen-sized stone. Q.E.D. You are in large trouble unless you have a super-duper answer immediately on tap. Which is why I consider it my duty to brief you as promptly and concisely as may be.

The fact is that at present (and perhaps for many years to come) it will not be possible to make gem-sized diamonds by the G-E process. The largest now produced are much smaller than the head of a common pin, and are thus a mite too tiny to look well on the 3rd finger of the left hand or in any bauble designed for feminine display. So if your gal believes you when you tell her this but still wants a sparkler, maybe you can sell her on the idea of a "simulated diamond." I don't know what the material is, but it is claimed in the advertisement to "bear an incredible resemblance to the real thing," and to have lasting brilliance.

Anyhow, here's the best of luck to you!

Mechanical Upgrading

A novel method of purifying rock salt, by mechanically removing impurities which it may contain, has just been developed and patented by the International Salt Co. Previously such cleansing was accomplished by selective crushing and screening, but at best it was expensive and rather unsatisfactory.

According to the new *modus operandi* (covered by U. S. patent 2,907,456) the crude rock salt, after preliminary crushing, goes through a hopper into a rotating drum. Inside the drum is a battery of infrared lamps which serves to heat up the moving material. Common salt (sodium chloride) crystals are transparent to infrared heat waves, while this is not true of the impurities common to rock salt, such as shale, dolomite, etc. As a result the rock salt remains quite cool as compared to the rock impurities mixed with it.

The heated material is next discharged onto a fast moving conveyor belt, which has been surface coated with a heat-sensitive adhesive. Since the rock salt is relatively cool, it does not stick to the adhesive coating but drops off the moving belt into a waiting receptacle. However, the rocky impurities are hot enough so that they adhere to the thermoplastic belt coating long enough to take them past the place where the rock salt fell off, and they themselves fall off or are brushed off into other containers.

International is said to be of the opinion that the basic process may have widespread usefulness in many other industries, and in diverse separation problems. Obviously, the question of fitting the proper thermoplastic belt coating to the particular type and kind of material being handled is something which will have to be worked out individually for each operation. The patent, mentioned above, names several possible ad-

As Soule Sees It (Cont'd)

hesives which could perhaps be used. These are based on sundry resins such as styrene polymers, thermoplastic terpene resins, and various cumars. The method of applying the thin adhesive coating to the surface of the belt can, of course, be accomplished in several different ways. These might include brushing or spraying from either a solvent solution, or with a hot-melt compound. Transfer coating of a hot-melt material is also a possibility.

In any case, the method appears to be an ingenious means of licking a stubborn problem which has been bothering the salt people for a long time. And it may well be that the basic idea will prove to be a life saver for puzzled experimenters in other industries.

Loyalty Oaths

Newspaper headlines recently have blared forth the fact that 16 United States Colleges have refused to allow their students to accept low-interest government loans in protest against an accompanying loyalty oath requirement. However, if the complete articles are carefully read, we find that 1,370 other schools here paritcipate in the program and that they and their student borrowers are proud and happy to deny in writing any Communist leaning or affiliation.

In affairs of this sort, it is difficult to understand why the heads of even 1.16 per cent of the colleges should shy away from a simple declaration that they are not members of any organization seeking to overthrow the government of the United States, by force or violence. Nevertheless, since these educators have raised the issue themselves, it is no more than fair to point out to parents, whose children are enrolled in any of the schools in question, that the mere possession of several advanced degrees is no guarantee of sound or unmuddled thinking. At times, pink has been the favorite color of certain spokesmen for institutions of higher education, while others were smugly sanctimonious, or were seeking publicity by any and all means.

When the youngesters themselves are given the privilege of an unpressured vote, we are confident that no one will need to worry about their clear thinking or their unquestioned allegiance to their country.

Up in the Air

The present resurgence of interest in balloons as a means of conveying men and scientific instruments into outer space probably stems from their simplicity and comparatively low cost as contrasted with other types of space experimentation. Although there have been a number of reported experiments involving plastic balloons, those which have achieved the widest interest and publicity fall into two general classes. The first is that in which the object of the experimental ascension was to reach a great enough height into the stratosphere to permit a clear view of the planet Venus, unhampered by the heavy layers of the earth's atmosphere. The first such attempt in 1959 took place near Paris, France, in April, when Dr. Andouin Dollfuss reached a height of about 39,000 feet in a hermetically sealed aluminum gondola pulled upward by 105 hydrogen filled rubber weather balloons attached to it in clusters along a 1500 foot nylon cable. The balloons were approximately 10 feet in diameter at take-off, but were expected to expand to 33 feet in diameter at high altitudes. Unfortunately, too many of the spheres burst in flight preventing the hoped-for 82,000 foot elevation to be reached.

Another Venus-studying expedition, originating in South Dakota and winding up in Kansas, in late November had better luck. In this attempt, Commander Malcolm Ross and Dr. Charles B. Moore reached a height of 13 miles in their plastic balloon, and were able to study the planet through a 16-inch telescope, as well as to make a number of very satisfactory photographs during the six-hour flight. Evidence was found of the presence of water in the atmosphere around Venus. This presumably would make possible the existence of life on that planet.

The second class of massive balloon experiments involves enormous plastic spheres one hundred feet in diameter. These are made of mylar 0.0005 inch thick, coated with a vapor-deposited skin of aluminum 0.0001 inch thick. Launching is to be accomplished by means of a rocket, and inflation at 1000 miles or so above the earth will result from the expansion of the four pounds of water ballast under the space vacuum.

The purpose of putting several of these huge spheres in orbit is to have them serve as backdrops from which radio and television waves can be bounced off and received at stations on the ground. If this proves practical, long distance or even around the world transmission of radio and TV would no longer need to depend on cables and towers, but could proceed in straight lines between the reflecting balloons. At present, the relay stations must be relatively close together since the signals cannot be transmitted around the curvature of the earth.

The first of these enormous balloons was launched by a rocket from Wallops Island, Va. in late October to test the blast-off and launching procedures. The sphere, at a height of about 250 miles above the earth, provided an unforgetable spectacle for the thousands from Maine to South Carolina who witnessed its brilliant passage through the evening skies, during its half hour life. No radio or TV signal tests were made with this preliminary test balloon, but the National Aeronautics and Space Administration is asking scientists in all other countries to join the United States later in the year in a world-wide attempt to test the practicability of this type of global communication.

Sounds like a project worthy of Jules Verne, at his imaginative best. (Whether or not jamming of such broadcast is possible by unfriendly operators, or whether the hodge-podge of "Westerns" cluttering up the air waves will be understood by our far Eastern friends remains to be seen. At any rate, if you see a lot of new "stars" speeding around through the heavens some night this year, don't call out the police. It is most likely that it will just be Walt Disney and Wyatt Earp getting into the act by launching their own solar billboards.)

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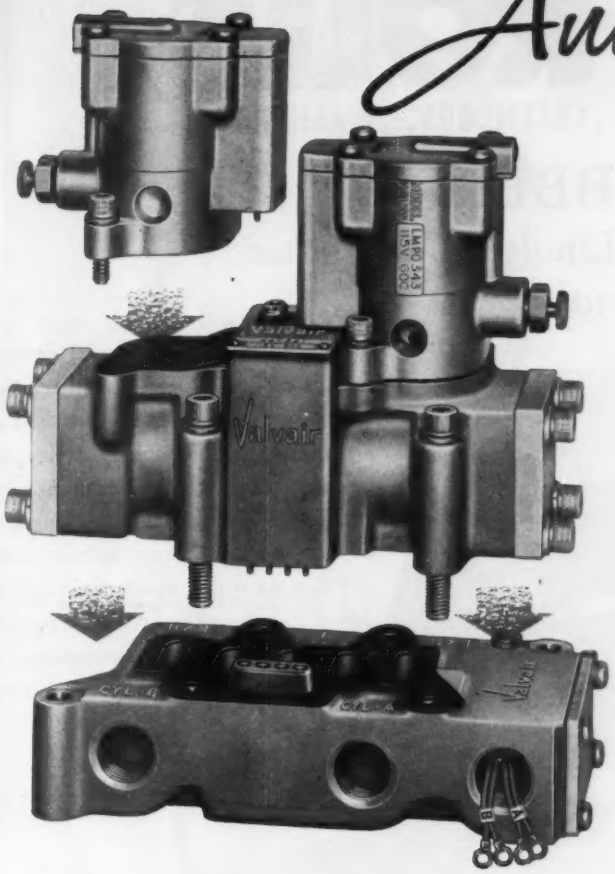

MODEL PD-441 shown. 4-way single or double pilot-operated types, for sub-base or manifold mounting. Aluminum and stainless steel components assure multi-million cycle dependability. Interchangeable pilots, with coils guaranteed against burn-out for life of valve, fit any plug-in Speed King. Coils for ac or dc, any voltage . . . 35 — 200 psi range . . . integral junction box . . . optional manual over-ride, common or separate exhaust ports, sub-base connected external pilot supply . . . ⅜ in. exhaust ports, ½ or ¾ in. inlet and cylinder ports . . . valve meets JIC standards.

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• A retreading firm in the Dominican Republic, Planta Recauchado, C. por A., has bought $100,000 worth of extra equipment. Since its formation in 1951, the company has quadrupled production and last year 23,000 retreaded tires were turned out. Two plants in Ciudad Trujillo and Santiago de los Caballeros are working at full capacity and are handling large orders for the sugar industry and government departments.

• The Indian trade press has pointed out that consumption of natural rubber in tennis courts is hardly mentioned. Rubber tennis courts are considered to be infinitely preferable to any other type and those which are pigmented green have all of the good points and none of the bad points of other types. The cost of maintenance is very low. It would be possible to convert other courts into rubber tennis courts at little cost.

• In the French trade press, a new principle of reclaiming is described. It consists of treating vulcanized rubber with plasticizers for three hours in an oven having an oxygen-free atmosphere. In order to avoid crushing this material, a coarse mechanical treatment which increases oxidation hazards, the substitution of rubber powder for bits of tread submerged in an adequate solution is suggested. The final vulcanizate exhibits superior properties to reclaim processed in an oxidizing atmosphere.

• The relation between stress and temperature at balance, the reversibility and methods of analysis are discussed in the leading French trade paper, *Revue Generale du Caoutchouc*. The study covers the stress reversibility of a rubber tread under small elongations, the temperature being varied while maintaining constant length. The authors describe the precautions required for the accurate calculation, in the case of a natural rubber pure gum vulcanizate, of the variation coefficients of both internal energy and entropy for an isotherm elongation under constant stress. The conditions under which a theoretical thermodynamic formula evolved by Gee is valid are also studied. With this formula, it is possible to deduce, from the above mentioned coefficients, the corresponding constant volume coefficients, which intervene in the kinetic theory of high elasticity.

• La Tubos Brasilit, Sao Paulo, Brazil, has installed a factory producing PVC tubes for chemical industries and the transportation of drinking water. The technical direction has been taken over by SOFOM, a French company belonging to the group Pont-a-Mousson. Production will reach about 400 tons a year.

• It has been pointed out in this column that many countries have adopted the metric system to integrate their economic system with the increasing number of nations adhering to decimal and metric standards. The *New York Times* reports that the decimal system, which was introduced in Japan at the beginning of 1959, is being followed with little confusion. Officials say that this is largely due to the educational effect of radio and television. In Tokyo, 84 per cent of the stores are using the decimal system. Before it was introduced, confusion was frequent as a result of the combined use of at least three different systems of measuring weights, areas and distances.

Old people still find things difficult. An old woman asking how to get to a house is confused when told that it is 100 meters (109 yards) along the road. She expects an answer in ken (one ken is 1.82 meters). Wind speeds, once given in miles per hour, now are reported in meters per second and rainfall is in millimeters instead of inches.

Some stores still use measures that indicate both gram and momme, or liter and go. One go is 0.1322 ounces or 0.18 liters. Sake, rice wine, is still being sold in the same type of bottle but with markings in liters. All vegetables, fish, and meat brought to central markets in Tokyo are now weighed in kilograms instead of kan (one kan is 3.75 kilograms or 8.2672 pounds). Sports associations have also adopted the metric system. In swimming, a record in yards is not now officially recognized. In boxing, fighters' weights are announced in kilograms.

Anyone violating the law enforcing the new system is subject to a fine of not more than 50,000 yen (about $125), but no one has ever been fined. Officials explain that this is still a transition period and guidance should come before punishment. In Tokyo, 20 officials visit stores in various districts to give guidance and issue instruction leaflets. Why is it that we can't do what Japan and many other nations can do?

• With the assistance of some financial circles, La Compagnie Brasileira de Extrusas, a Brazilian extruding plant, has organized a firm to manufacture

On the Continent (cont'd)

machinery for the plastics industry. The firm, to be called La Companhia Brasileira de Equipamento, will be located in Sao Paulo.

• In the *Frankfurter Rundschau,* published in Frankfurt, Germany, the following item was recently published: "A United States manufacturer of tires has figured out that it is possible to manufacture 7,000 pair of Nylon hose from the material which is required to build one of those giant tires having a diameter of more than nine feet, a width of about a yard and weighing about 1.8 tons. In Germany, such a tire would cost about 56,000 German marks (about $13,300) and the import duty would amount to an additional handsome sum. Fortunately enough, we do not need such tires in the German Republic because there is no truck which has the capacity to transport 100 tons; this is the type of truck for which those giant tires are required."

It is not the first time that we have come across a fabricated news item which evidently some dreamer cooked up in a nice little German town. If this gentleman would have used his pencil, he probably could have found out that 7,000 pair of nylon hose can never weigh 1.8 tons. A colleague of this crystal gazer has concocted a story, and we have actually seen the original Germany copy of it, according to which the postal authorities in New York City shoot the mail by means of pneumatic tubes to every floor of the 277 skyscrapers. Even private apartments receive the mail by that pneumatic installation. The writer said in particular "when the family sits down for dinner, a red pilot light lights up and the lady of the house knows that the mail, amounting to ten pounds, has arrived in the reception chamber of that particular apartment."

• The Venezuelan firm, La Negros de Humo Venesolano, will construct a factory in the vicinity of Moron to supply the domestic tire industry with the necessary raw materials.

• Little accurate data are available on the polymerization mechanism of dienes by lithium. When butadiene polymerization times are recorded with decreasing amounts of present lithium, it is noted that the time does not vary as long as the catalyst concentration is over 4.1×10^{3} mol/liter. However, the average molecular weight is increased and the gel content drops. After explaining how one should ensure reproducible results, the author points out that a parallel is to be drawn with the existence of a similar "threshold" in styrene polymerization by butyl-lithium.

• Shell Pernis will manufacture synthetic rubber in a new factory in Pernis near Rotterdam, Holland. The unit will begin operations in March 1960 having a capacity of 50,000 tons of synthetic rubber annually. Shell has studied the production of synthetic rubber in America and has concluded that Europe will use approximately 1 million tons of rubber during 1960. The amount of synthetic rubber required will be in the vicinity of 300,000 tons.

The manufacturing process is based upon the use of styrene and butadiene manufactured from butane delivered from nearby refineries. The new factory will primarily cover the requirements of the Benelux countries (Belgium, Holland and Luxemburg). Considerable amounts will be delivered to other participants in the European Common Market and later on a sizable share of the production will be exported.

• The first automobile tire factory in Taiwan, Formosa, went on stream a few weeks ago. The unit has been erected with the help of a Japanese tire factory. Production is scheduled at 4,000 tires and tubes a month in order to cover the requirements of the island. An enlargement of the factory is contemplated with the additional production to be exported.

• German rubber factories are working overtime in order to satisfy increasing demand caused primarily by expansion of automobile production. In spite of the price increase of some raw materials, selling prices of the tires have remained stable. One of the largest factories, Continental Gummi-Werke Aktiengesellschaft in Hanover now employs more than 23,000 people, reaching the highest level of employment in its 87 years of existence. In the first six months of 1959, it was necessary to increase the number of employees by 800 persons and in the third quarter of 1959, an additional 1,000 persons had to be added to meet production demands.

• Rubber vulcanization by gamma rays is discussed by several authors in a recent issue of the French *Revue Generale du Caoutchouc.* The authors point out that after a survey of former work on rubber vulcanization by radiation, the influence of a number of additives, together with the irradiation medium, on the speed of curing by gamma rays has been studied. The action of rays was more specially enhanced by a chlorinated monomer (dichlorostyrene), a non-monomer halogenated derivative (Freon 113), a metal oxide (litharge) and a litharge-p-dichlorobenzene combination. A comparison between radiation vulcanizates and chemical vulcanizates shows that neither method is entirely preferable and choice depends on relevant criterion.

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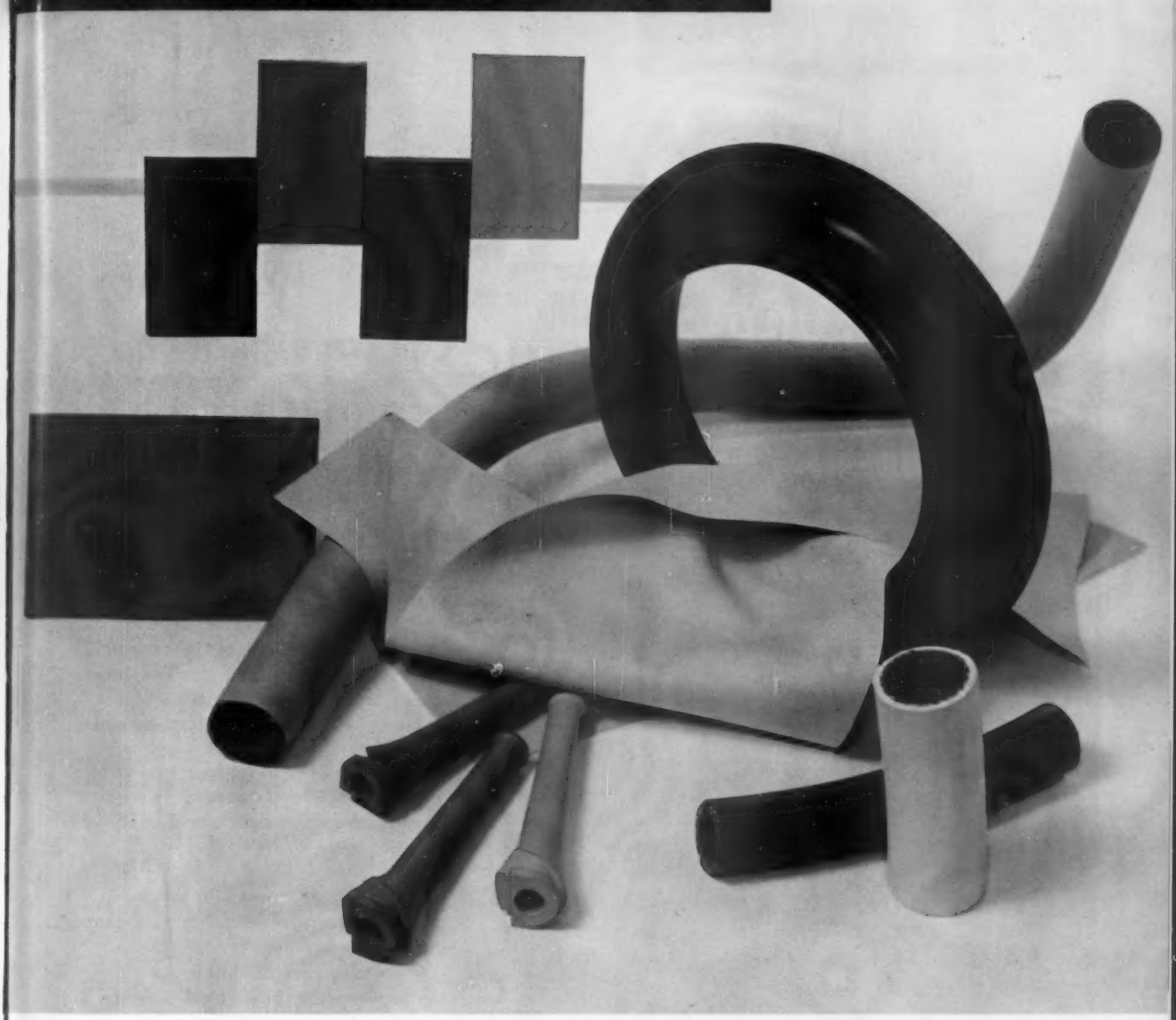

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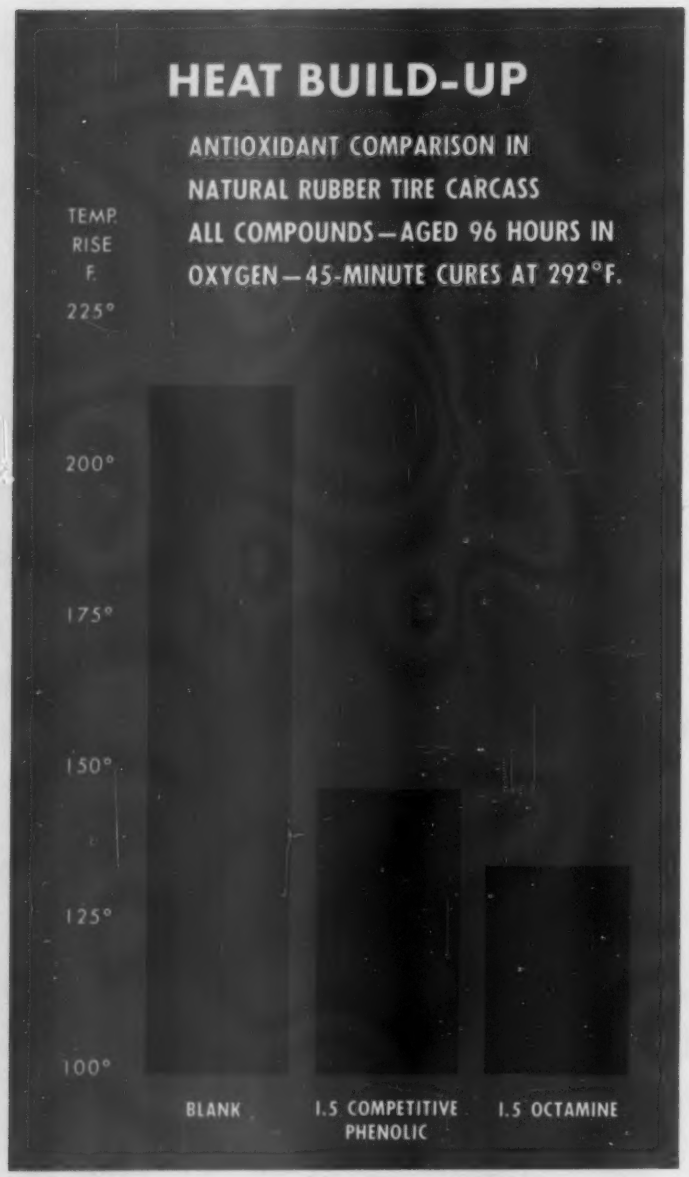

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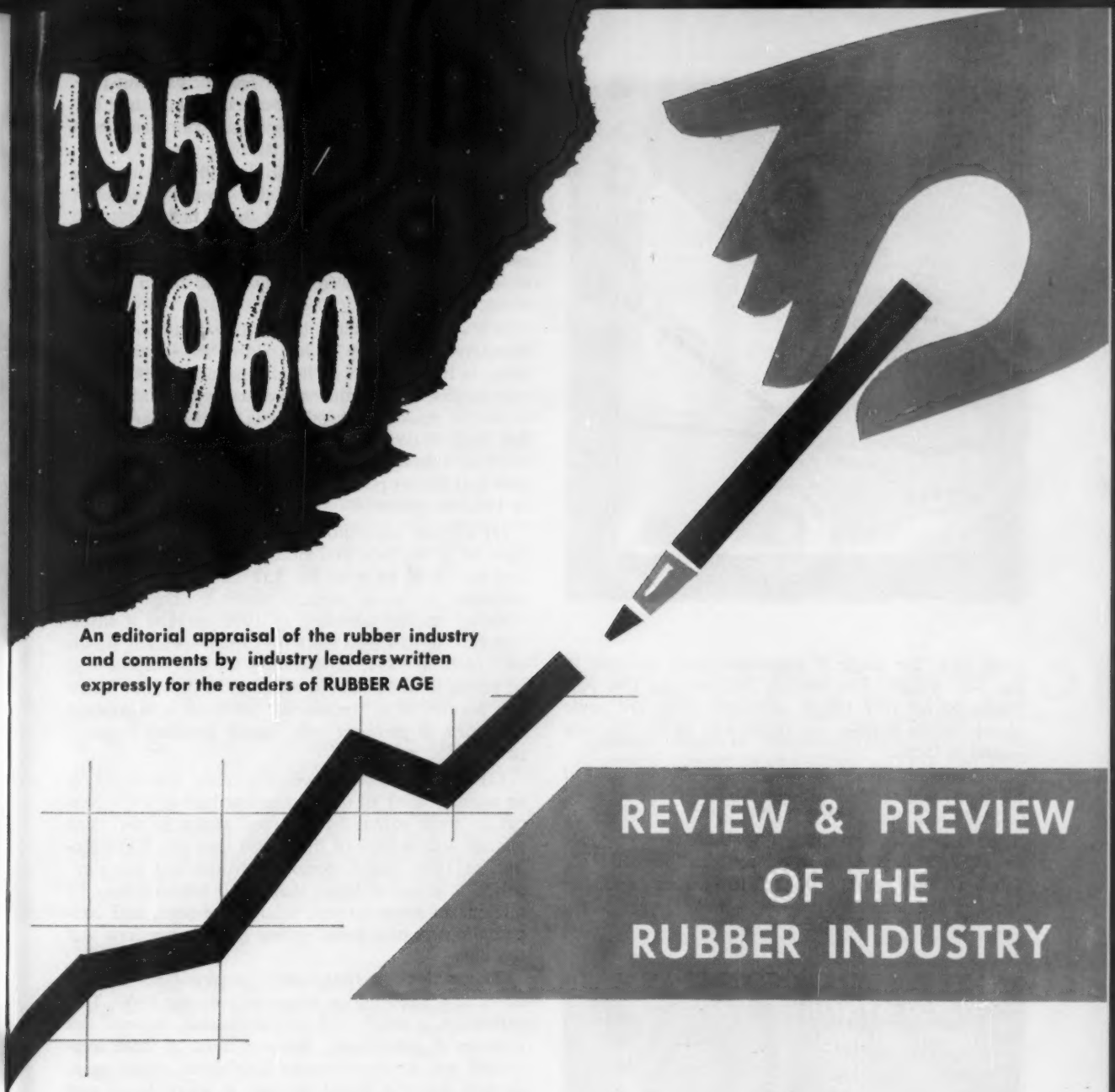
1959 1960



An editorial appraisal of the rubber industry and comments by industry leaders written expressly for the readers of RUBBER AGE

REVIEW & PREVIEW OF THE RUBBER INDUSTRY

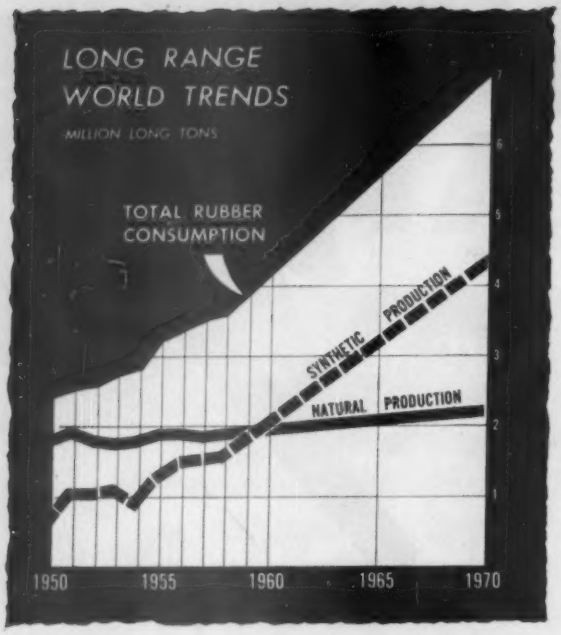
THE GENERAL ECONOMY

A New Year, beginning a new decade, will see a continuation of 1959's steady thrust upwards; the 1960's may bring greater growth than witnessed before in any previous decade of our nation's history.

► The decade a-borning has been labeled "the soaring '60s"; "the decade of opportunity," and "the rosy decade," by various economic prophets in recent weeks. All of these may express accurately what the decade will mean to those who have the ability and the means to grasp its promises and opportunities. No one disputes—at least, publicly—that this New Year, and perhaps *every* New Year in the 60s, may find the nation's over-all economy soaring to new highs, with economic horizons beckoning to those who read, correctly, the signs of the times.

However, it is much easier to prophesy about the year ahead than it is about the decade ahead. It is well to bear in mind that there is nothing automatic about anticipated economic progress. It will come *if* the correct governmental policies are pursued, *if* the right kind of business activities are carried out, and *if* there is no drastic change in the economic attitude of millions of consumers. (Also, *if* there is no devastating H-bomb war, with incalculable destruction coming in its wake).

The immediate past—1959—provides some good



clues as to the shape of economic things to come in the year ahead. The outlook for progress this year seems to be very bright, although there *are* some clouds on the horizon that might well be kept in view —and in focus.

Gross National Product (GNP)—the sum total of all goods and services produced by everyone at work —likely will hit a $505 billion a year rate before 1960 is over. It climbed to a $480 billion a year rate in 1958, ending what one economist termed "the fabulous '50s." Yet, it is well to bear in mind that some of the increases in GNP—year by year—have represented price increases, not real increases in production. In 1959, prices increased around two per cent, despite the most determined efforts of both government and industry.

The odds are great that prices will inch upwards about three per cent in 1960. They could go up even five per cent. It depends on such factors as the nature of the final steel settlement, the outlook of consumers as the year wears on, and other factors about which only the foolhardy would make predictions.

It is significant—showing the forward thrust of the economy—that in 1959, in spite of the longest steel strike in history, with all its adverse effects, the economy headed slowly, almost inexorably, toward higher economic peaks. The pace was quicker during the first half, of course, but the over-all growth was not stopped, although deterred, during the last half. The principal factors pointing to a higher economic plateau in 1960 are these:

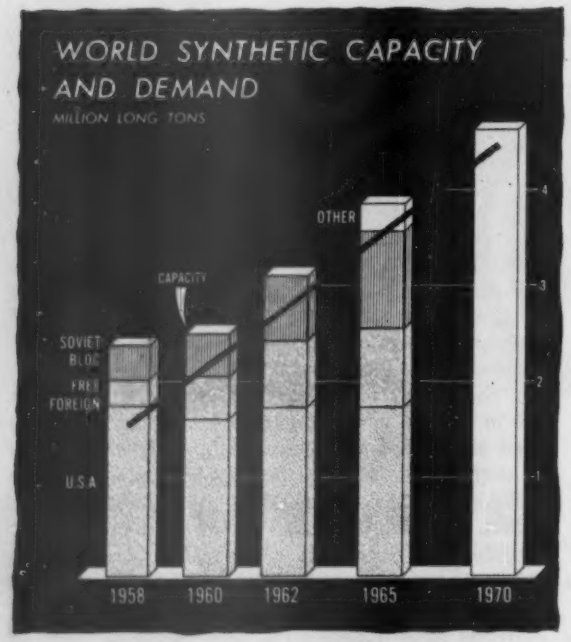
(1) Capital expenditures on new plant and equipment by all business and industry will top $36 billion, and may well go over the $37 billion-a-year mark, according to plans already made by businessmen. Although capital spending in 1960 may be a shade under the former high mark for capital spending which took place in 1957, expenditures for this purpose will be higher in 1960 than in either 1958 or 1959. There can hardly be a "recession," or even a significant downturn, in prospect with capital spending going at such a high rate.

(2) Personal income, which climbed (measured on an annual basis) all during the first half of 1959, was cut to some extent by the steel strike in the third quarter and in part of the fourth quarter. Nevertheless, as 1959 ended, personal income was being received at a rate of better than $380 billion a year by millions of wage-earners, salaried persons, and coupon-clippers, plus those getting old age pensions and the like.

The outlook indicates that personal income will climb to a $400 billion a year rate during 1960. This will mean a steady rise in "disposable income" for millions of individuals. Because most of these individuals are optimistic about the future, according to Federal Reserve Board surveys, it seems likely that virtually all of this disposable income will be spent. Some people, perhaps a great number, will obligate future income by borrowing, or buying on installments, or using charge account credit.

(3) The thrust of an expanding population, with all the challenges it entails, continues to be a powerful force in the economy. The U. S. population increased more than 3,000,000 (net) in the year just ended. The nation will pass the 180 million population mark by April. By 1965, there will be more than 200 million of us.

(4) Construction, over-all, will hit the $55 billion mark in 1960. Since a lion's share of this will be public construction, already on the boards and financing for which is available or in sight, there is little chance of any sagging in this important economic bullwark. Private non-farm homebuilding may be down to 1,100,000 units in 1960, but spending by



governments (federal, state and local) and industry will make up for the slack lost through the decline in new home construction, if this does materialize.

On balance, considering *all* the factors, 1960 shapes up as another 1959, on a slightly higher economic plateau, but with many of the problems of 1959 continuing well into the New Year.

For instance, the problem of subtle inflation will continue to plague the economy and the body politic. Many of the political battles will be fought over this question, as various points-of-view come into conflict on the national arena in the nation's capital. Inflation, as usual, will win some battles, although its opponents may get in some good licks.

Closely tied into this problem of fighting inflation will be the kindred difficulties inherent in formulating a correct fiscal policy for Uncle Sam and the right credit and monetary policies for these days. Finding the *best* national policies to pursue—on public financing, and credit and monetary moves—is not an easy task. It is doubtful if anyone ever will get the *one* perfect answer, for, as in life, the assuagement of one ill does not guarantee a person that he will not fall prey to another ailment.

A continued fight on inflation apparently will involve a close hand on the credit throttle—what some politicians call "tight money and high interest." Many business observers expect money to become even tighter in the coming months, and interest rates to hold firm or to go higher, certainly not downward. In the face of both "tight money" and the steel strike, what gave the 1959 economy so much bounce to the ounce?

Observers are fairly certain now that it was a resurgent optimism among consumers by the millions, who went into debt at a rate that has been equaled or surpassed in only one other year in U. S. history—1955.

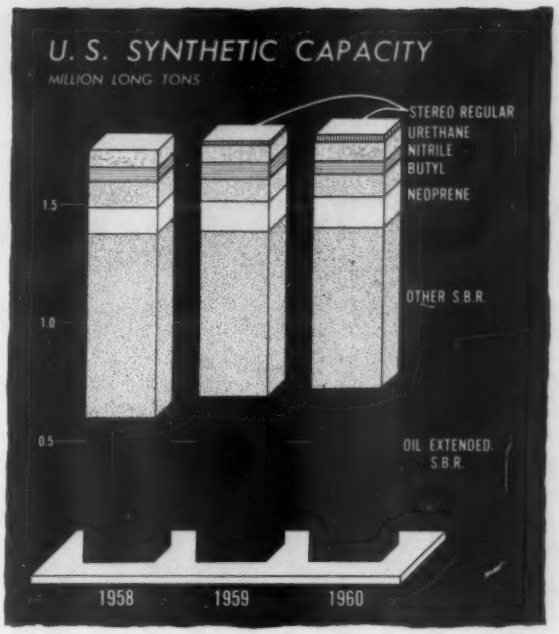
Record Consumer Debt

Consumer debt went up at record or near-record rates all during 1959. In July, new installment and charge account credit went up more than $500 million. In August, the total went up again by about $450 million. In September, it kept climbing at the same rate, and so on through until the end of the year, at which time it stood at more than $51 billion —by far the highest mark in all history.

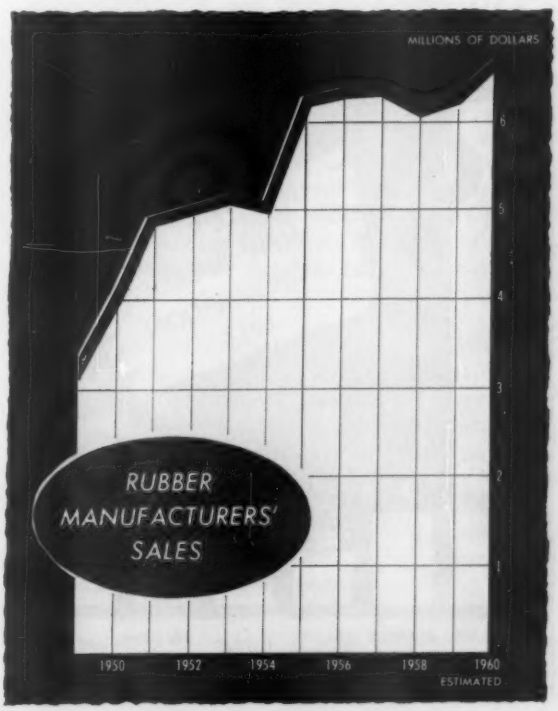
This, it is agreed, is the biggest single reason why the economy rebounded so vigorously in early 1959, and held its own, against the drag of a major steel strike, for all of the third quarter, and bounded upwards again in the fourth quarter.

Yet, the enormity of this consumer debt, piled atop a record-breaking mortgage indebtedness and unparalleled federal, state and local government debts, gave many businessmen pause in assaying the future. It explained, as much as anything could explain, why there was hesitancy in many business quarters about predicting "big gains" in 1960 over 1959 sales.

Another factor which bears watching in the New Year is that of "tight money", with the inevitable high interest rates it causes, being pursued by the Federal Reserve Board. This could be one reason why spending for new plant and equipment, planned earlier in the year, was deferred in the latter part of 1959, although the steel strike likely was a more vital factor.



Senator Hubert H. Humphrey (Dem., Minn.), who accurately foretold the recessions of 1954 and 1958 far in advance of their actual occurrence, recently pointed out that, in spite of greatly expanded economic activity, the ratio of money in existence to GNP actually is lower right now than it has been

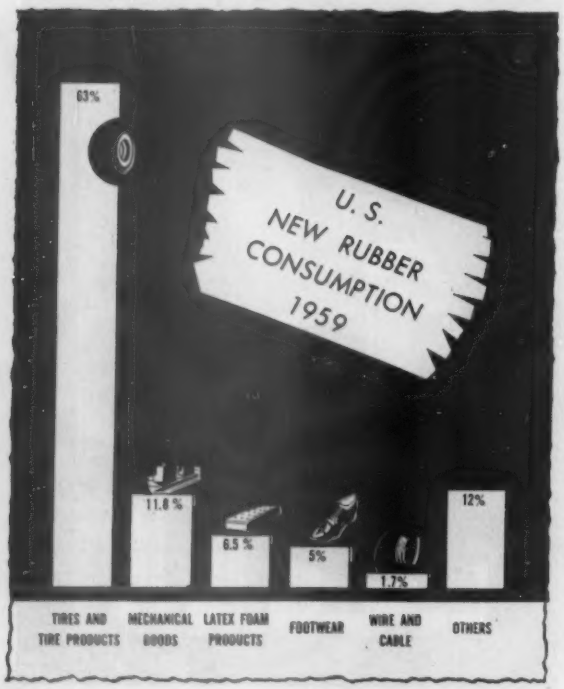


at any time since 1929. He has predicted that unless there is appreciable relaxation in the "tight money" and high interest policies, there could well be an economic downturn by mid-year, 1960. He declared that even a "dip" in economic activity likely would run unemployment up to a dangerous 6,000,000 level (from its present approximately 3,400,000 unemployed) in a relatively short time.

If consumers do not become too optimistic—or too pessimistic—in 1960, and granted that credit will not be tightened to the extent of choking off legitimate growth aspirations of smaller and medium-sized businessmen, a downturn possibly will not materialize in mid-year. However, even such economists as Dr. Emerson P. Schmidt, economic director for the U. S. Chamber of Commerce, expect the greatest forward economic push to come in the first half, with the second half of the year showing a less-spectacular growth.

Patrick Henry said that he knew of only one safe guide to the future—and that was the past. If we merely project the past — 1959 — into the coming twelve months, we get a year of sustained economic activity on a very high level.

However, it might be wise—in considering the prophecies of some who claim we can never again have a "depression," a "recession," "hard times," or whatever an economic sag may be called—to remember the famous statement of Voltaire to the effect that "the only thing we learn from history is that people never learn anything from history." If this is still true —and it may be—it is possible that there *may* be rougher economic weather in prospect by mid-year than now seems apparent. Careful business and governmental activities may steer the economy away from the darkest clouds on the horizon.



THE RUBBER INDUSTRY

Unparalleled optimism noted in "top tier" of management about the outlook for 1960. New records likely to be set in capital investment, in production, and in sales of all types of rubber goods.

► In view of the generally favorable economic outlook, coupled with population and travel trends (and the increased impact of "country living" by commuters), the unparalleled optimism in top management of the major rubber companies about 1960 would seem to be abundantly justified.

The mere fact that, many times, the optimism is tempered by references to intense sales competition does not cause qualms among rubber industry leaders. They are used to competition, and, in fact, most of the companies in the industry have thrived on it.

Of all the kinds of industry in America counting confidently on a bigger future, the rubber industry is up front with plans for capital spending in 1960. Unlike their more hesitant counterparts in some industries, rubber company executives are not trimming down their capital spending estimates. If anything, they are raising their sights to prepare for a new surge of growth.

Capital spending by all the more than 1,500 companies in the rubber industry, will total at least $233 million in 1960. This will equal, and it may well surpass, the record set in 1957, when capital spending ranged between $230 million and $240 million. Such spending dropped to $134 million in 1958 and climbed back to $200 million in 1959. Note that the capital spending projected for 1960 is substantially more than *double* the $105 million of such spending in 1950.

Renewed Sales Emphasis

A renewed emphasis on sales and distribution is expected to be a highlight of industry activity in 1960 and the years beyond. A rubber industry executive recently suggested to rubber manufacturers that they face a decade of challenge which will test the industry's distribution and marketing techniques as never before. The rubber industry is and has been a very competitive industry—in fact, one of the most competitive of all industries. This competition has provided the industry with a daily challenge to improve its products, manufacturing processes, and merchandising and selling techniques.

Many in the industry now believe that the selling competition which has been seen in the last 20 years will be as nothing compared with the hard-hitting selling and merchandising competition which will be seen in the coming decade.

It is now known that approximately 1,620,000 long tons of new rubber were consumed in 1959, a new record. It is also felt that world production of synthetic rubber will more than double in the ensuing decade. Natural rubber output, for the next ten years, will remain at about the present level according to the most knowledgeable estimates.

By 1970, worldwide rubber consumption should rise by about two-thirds above the present levels to approximately 7,500,000 long tons a year. With such an increase in estimated demand, the gap obviously must be closed by synthetic rubber which appears destined to more than double during this same period.

In this area of synthetic rubber, some recent developments are having their impact. The new "stereo-regular" rubbers may be expected to replace natural rubber in applications such as heavy duty tires. Other synthetic rubber types will undoubtedly make a strong bid to take a share of present styrene rubber outlets.

Urethane, particularly, is advancing, principally in the cellular rubber market. Another outlet for urethane rubber is in the field of mechanical goods where its unique properties can be employed to advantage.

Indications are that the rubber industry, in spite of anticipated record-breaking production and sales, will have its problems in 1960, as it has had in the past, among which are the following:

(1) Finding a way to consolidate general labor union contract issues so that these can be settled at one time, without the necessity of having, or running the risk of having, more than one strike a year. Ross R. Ormsby, president of the Rubber Manufacturers Association, pointed up this matter in these words:

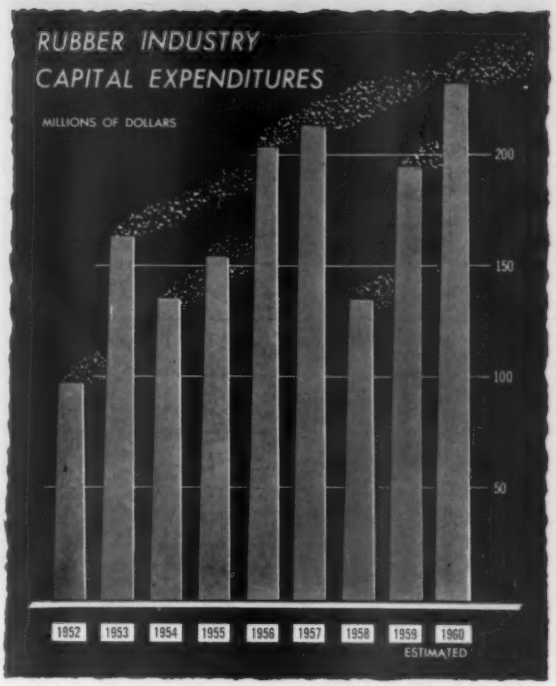
"Many of our companies negotiated in 1959 on general contract issues, pensions and insurance agreements, and then, later in the year, on wages. This means that in several instances companies in the rubber manufacturing industry were subject to a series of strike exposures during the course of a single year.

"A short time after the settlement of some of our lengthy strikes this past spring on pensions, insurance and contract issues, it was announced that these same companies would now commence bargaining with the union on wages. We had calls at the RMA from representatives of other industries wanting to know what was going on—and why we were starting to bargain again so soon on other issues.

"Obviously, this is not an efficient way to run a business—it is not in the best interests of our employees, our customers, or our stockholders. These prolonged series of negotiations are expensive to both management and the union. For a considerable period of time, companies in our industry have attempted to consolidate these bargaining sessions, but the union has thought otherwise. Union leaders should cooperate with our individual companies in bringing about one set of negotiations in which all of these matters can be settled when they are properly open for collective bargaining."

The problem of "pattern bargaining" in wage contracts also is vital. The union, Mr. Ormsby pointed out, generally selects one of the major rubber companies as a pattern-setter, and, after an agreement is reached, indicates that this pattern should be followed by all other rubber companies.

"There is no such thing as a rubber industry pattern on collective bargaining, and there should not be," he declared. "Our industry manufactures more than 40,000 rubber products. The economics of producing tires as against producing molded and extruded items —heels and soles—rubber sundries—rubber footwear



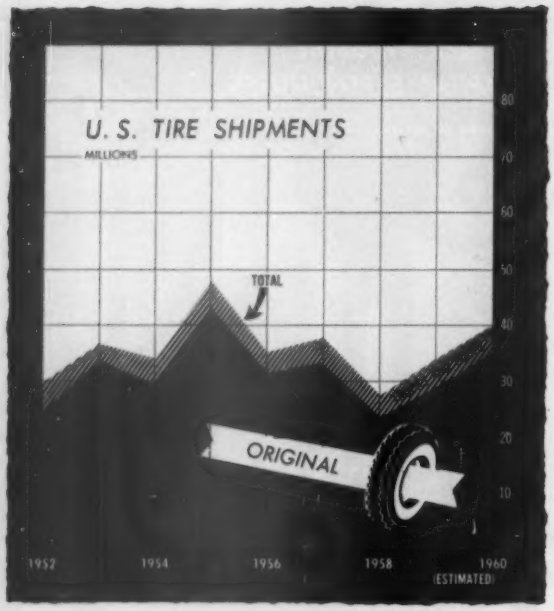
and many others—is as different as day is from night. The rubber manufacturing industry is made up of several industries using a common raw material, and if all the segments of the rubber industry are to grow and expand and provide more jobs and better jobs, responsible union leadership must recognize the economic facts of life as they vary among the separate branches of the rubber industry . . ."

(2) Another big problem of the industry is tied up with raw materials. In 1959, the price of natural rubber skyrocketed, and, from the standpoint of U. S. manufacturers, this was extremely uncomfortable and, mostly, uncalled for.

Congress, in the second session, 86th Congress, will consider an administration plan to dispose of some 470,000 long tons of rubber in the stockpile, declared excess to the nation's security needs. Rubber industry leaders believe that "an orderly and definitely stated plan for disposal of surplus rubber from the government's stocks will not only effect an important savings to the taxpayer, but will also be in the long term interest of both the producers and consumers of natural rubber."

The rubber industry, through research and development, has made tremendous strides in improving both the appearance and quality of its standard products. Just as important, a great many new products were introduced in 1959 as an outgrowth of the industry's total research and development efforts.

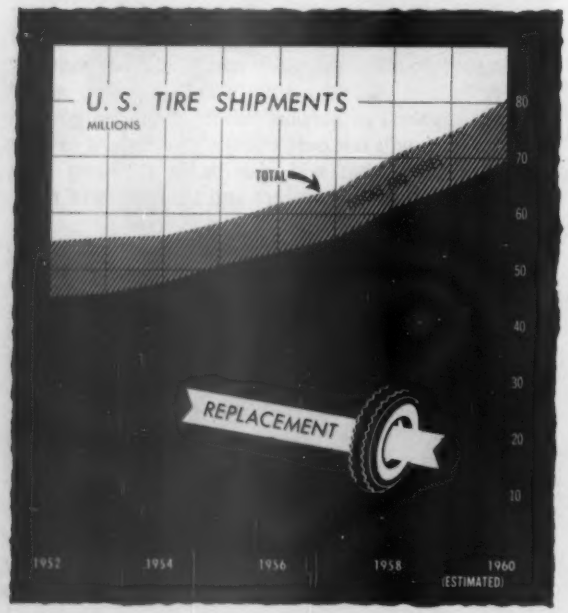
The domestic rubber industry consumed 879,912 long tons of synthetic rubber in 1958 and an estimated 1,060,000 long tons in 1959. It is expected that 1,094,000 long tons of all types of synthetic rubber will be consumed in the United States in 1960. As for natural rubber, 484,492 long tons were consumed in the United States in 1958; an estimated 555,000 long tons in 1959, and it is believed that about 556,000



long tons of natural rubber will be consumed in the United States in 1960.

Synthetic rubber production in 1959 is estimated at close to 1,300,000 long tons, compared with the 1,118,173 produced in 1957, the previous record year. Synthetic rubber exports in 1959 ran to more than 280,000 long tons, much above the 203,468 long tons exported in 1957. In total, it is expected that something in excess of 1,300,000 long tons of synthetic rubber will be produced in 1960.

Reckoned in terms of total consumption, the rubber industry in the United States consumed 1,620,000 long tons of all types of new rubber in 1959 and this figure is expected to grow to 1,650,000 long tons in 1960.



THE TRANSPORTATION SEGMENT

Few economists doubt that 1960 will see a big spurt upwards in tire sales, setting new records in all categories.

► A year ago, there was speculation about whether or not the U. S. automobile industry could sell 5,500,000 units in 1959. Now, it is known that the industry produced 5,590,000 cars. The Automotive and Transportation Equipment Division, Business and Defense Services Administration, U. S. Department of Commerce, has made a "conservative" forecast that car production will increase by 21.8 per cent in 1960, going up to 6,700,000 passenger cars. This would be the highest since 1955, when 7,920,186 automobiles were produced.

Last year, there was speculation about how far over 60,000,000 replacement tires the 1959 sales figure would go. It is known now that the rubber industry shipped more than 65,000,000 replacement tires.

Right now, there are more than 70,446,000 motor vehicles registered in the nation, according to the U. S. Bureau of Public Roads, or close to 2,000,000 more than a year ago. The steady three per cent rise in motor vehicle registrations continued in 1959 as it had for most of the years previous in the 1950's. This has taken place in the face of scrappage running close to 4,000,000 old cars a year, too.

High New Car Sales Predicted

It is a gloomy prophet, in Detroit, who does not expect new car sales to top 7,000,000 in 1960, despite the "conservative" BDSA "guesstimate." More families are moving up in personal income, moving out to the suburbs, and moving into the two-car status. Exports are expected to hold steady about the 300,000 figure, but they may decline, due to higher production by U. S.-controlled companies overseas, and other factors.

Total usage of cars and trucks during a year is just as important—to rubber companies—as the number of new cars produced. If travel continues to climb in 1960, as it did in 1959, it is easy to foresee that the replacement market will be bigger than ever in this New Year.

A significant trend in the industry relates to the growing importance of retreaded tires. In 1958, a new high of 37,000,000 retreaded tires was set. This contrasted with pre-World War II, when retreads accounted for less than 10 per cent of all replacements. By 1948, they had captured one-fifth of the market. Currently, there is a retread or recap for every two new replacement tires on the road. For trucks and buses, it is even more favorable—one retread or recap for every new replacement tire.

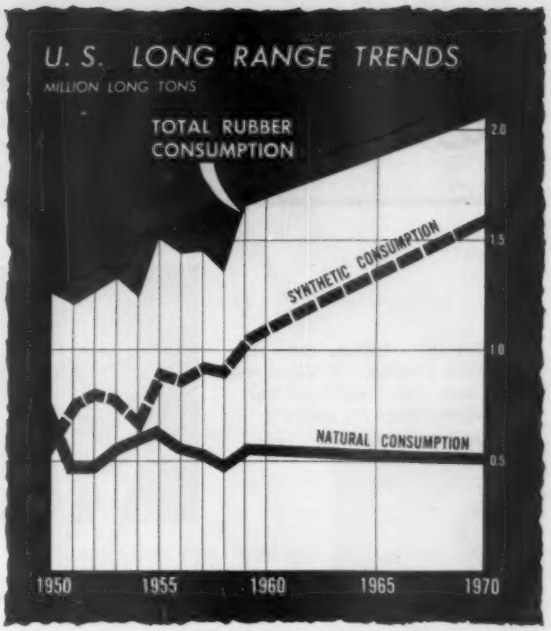
It appears that the safety and economy of retreads, coupled with new machinery which makes it possible for one press to handle as many as 30 passenger tires an hour, will see the retread business zoom in importance in 1960 and the years ahead.

There are 10,000 retreaders in the U. S., some of them rubber producers. United States Rubber Co., for

instance, has opened 12 retread shops since launching its company-owned retail outlets last summer. Firestone Tire & Rubber Co. maintains company-owned shops in 200 marketing areas and supplies tread rubber to another 1,500 dealers, claiming that one out of every five retreads ride on Firestone tread rubber. Goodrich spent $1.5 million in 1959 to open 10 new retread plants and to modernize 15 others, after having doubled facilities in its four tread rubber plants since late 1957.

In 1957, the tire industry produced 433,561,000 pounds of tread rubber. In 1958, this climbed to 450,000,000 pounds, and in 1959, it topped 475,000,000 pounds. The estimate is made confidently that 500,000,000 pounds will be produced in 1960. Output of tread rubber rose four-fold in the 1950's.

The transportation segment of the rubber industry, in all its phases, will enjoy a banner year of sales in 1960, and, except for original equipment tires, it may set new records in every division. Observers do not expect 1955 to be upped on original equipment until 1961 or 1962.



THE NON-TRANSPORTATION SEGMENT

The sky's no limit as to the uses that can be made of rubber, or the sales possibilities of these products.

► Old-timers in the rubber industry—including those who joined it as late as 10 years ago—once were surprised at the vigor being shown by the non-transportation uses for rubber. Now, they are so used to seeing this segment make gains that they would feel disappointed if it ever were to level off, and it gives no signs of doing so.

It was recently observed by an industry executive that more and more rubber roads, rubber rail crossings, rubber sidewalks and conveyors of people as well as goods, more applications for rubber in clothing . . . are on the horizon for these coming years.

Just as the dollar volume of non-tire rubber products has gone up every year during the "fabulous '50s," just ended, so it is expected to climb in 1960 and in each of the years ahead in the "soaring '60s."

The manufacture of non-tire rubber products consumed almost 600,000 long tons of new rubber in 1959, compared to 569,843 tons in 1955, the year that previously had been the record.

Because of the generally bright economic picture, and the continued growth of the industry economy, the future looks particularly rosy for manufacturers of conveyor belting, cellular products (latex, blown, urethane, vinyl), industrial hose and rubber footwear. And, in spite of the expected downturn in new home construction, the home renovation and repair market is almost certain to be bigger in 1960 than it was in 1959.

There are estimates that one out of every two existing homes will undergo some kind of renovation, repair, refurbishing, or refurnishing, in 1960. This could lead to new highs in consumption of such products as rubber-based floor coverings, rubber-based paints, and many other rubber products used in home repair or in furniture.

It is interesting to note that there has been a significant realignment in new rubber consumption in the non-transportation segment. In 1959, approximately 37 per cent of all the new rubber consumed went for non-transportation products, the same percentage this segment of the industry held in 1957. In 1957, however, three per cent of all the new rubber consumed went into wire and cable. Today, it is estimated that 1.7 per cent goes into wire and cable. Thus, it is seen that plastics have made significant gains in a field where rubber formerly held an advantage.

Latex foam rubber is another area in which gains have been registered in the past few years. In 1957, latex foam rubber products accounted for five per cent of all the new rubber consumed. In 1959, it is estimated that 6.5 per cent of all the new rubber consumed went to latex foam rubber products. Mechanical goods also moved ahead significantly from 10 per cent in 1957 to 11.8 per cent in 1959. Footwear has dropped from six per cent to five per cent, verifying the fact that imports are becoming an increasingly important market factor.

The 1959 profit picture in the non-transportation segment was a bit brighter than it had been in 1958 and former years, and, if sales go higher in ratio to the growth of the general economy, it is believed that profits will be higher in 1960 than ever before.

The key to the situation lies, as usual, with the average consumer and how he chooses to spend the disposable income he will have at his beck and call. Since this is interrelated to the effectiveness of merchandising and sales techniques, the problem also goes right back into the laps of management.

If the industry meets the challenges of 1960, it will reap the benefits of the undoubted opportunities which lie ahead.

Statements from the Industry

We most likely will use more than 1.7 million long tons of rubber and of this total about two-thirds will be synthetic which the industry manufactures here in the United States.

William O'Neil

It is reasonable to forecast that the rubber industry will record its greatest sales volume in 1960—even greater than it registered in 1959, which was the most rewarding year in the industry's history. But we must temper our predictions pending settlement of the steel industry's labor problems. The steel industry's strike was reflected in our 1959 fourth quarter results . . . and it might possibly be felt again in our first quarter 1960 summary, but the nation's economy will come bouncing back strongly thereafter if steel's negotiations result in an anti-inflationary decision at the bargaining table.

The factors for good business include: (1) a rising demand for all products from a growing population; (2) a sizable increase in capital expenditures to provide for the growing demand; (3) a greater number of jobs; and, (4) the necessity of maintaining a program of research, development and production of the things vital to the security of world peace.

Forecast of increased demands for automobiles and trucks in 1960 is one of the encouraging signs for good business for the rubber industry. We produce many hundreds of items in addition to tires for the automotive industry . . . and the indicated upturn in automotive production means that our plastics, chemicals and mechanical rubber goods divisions in addition to our tire factories will be kept busy.

To meet the tire needs for the increasing new car and truck production as well as the growing replacement market, the rubber industry will produce a record 126 million tire units in 1960. Naturally, such a tremendous tire production will require the greatest consumption of rubber in the history of our industry. We most likely will use more than 1.7 million long tons of rubber and of this total about two-thirds will be synthetic which the industry manufactures here in the United States.

Because of the uncertainty in the crude rubber market and because of the uncertainty of tire prices, our profit picture, like all the other major manufactures, is a question mark. Despite a rise in crude rubber costs from 26c per pound to 40c per pound and increased labor costs, tire prices in 1959 actually were reduced.

The price of crude rubber is of relatively greater importance to us because of our predominant position in the truck tire field. Because crude rubber is still the basic material used in our truck tires, our percentage of consumption is higher than the industry pattern. The non-recurring start-up costs of our new $12 million tire manufacturing plant at Mayfield, Kentucky, will also be a factor in our 1960 earnings results.

William O'Neil

President, General Tire & Rubber Co., Akron, Ohio

Industry prospects for 1960 physical volumes now seem very bright. Indications are that new rubber consumption will pass 1,650,000 long tons, or 3 per cent over 1959.

J. W. Keener

The year 1959 saw the rubber industry make a complete recovery from the recession and resume its long-term growth trend. Demand for finished rubber products was unusually strong as evidenced by a 17 per cent increase in new rubber consumption. Sales were at a record high, but the industry's profit performance was adversely affected by (1) strikes in rubber and steel, (2) intense competitive conditions, and (3) increases in employment costs and natural rubber prices. Industry prospects for 1960 physical volumes now seem very bright. Indications are that new rubber consumption will pass 1,650,000 long tons, or 3 per cent over 1959, and there is a good possibility of a consumption level as high as 1,700,000 long tons.

While 1960 will not match 1959 in percentage of growth, the expected gain over today's high business level will be substantial. This prediction for 1960 is based on four major factors:

(1) The pickup in tire shipments for new cars and trucks as the automotive industry recovers from the steel strike (assuming no extended resumption of that strike).

(2) Further steady growth in the market for replacement tires. Combined original equipment and replacement tire sales are expected to increase by 10,000,000 units, or 8 per cent, a much-greater-than-normal increase.

(3) The outlook for a 7 to 8 per cent increase in the nation's total industrial production.

(4) A predicted 5 to 6 per cent increase in consumer incomes (about $18 billion).

During the 1960's more basic research and greater capital expenditures will be needed to:

(1) Meet the ever-increasing demand for new rubber in the face of a relatively constant supply of natural rubber. Demand for general purpose SBR in this country will increase 25 per cent in five years and by 80 per cent abroad. The growth trend in specialty synthetic rubbers is even more rapid. In addition, by 1965 there will be a substantial requirement for new types of rubber as SN (for synthetic natural), an isoprene rubber developed by B. F. Goodrich research in 1954.

(2) Reduce costs. Increases in employment costs since World War II have been greatly in excess of the ability of the industry to absorb these costs through productivity gains. Research to develop improved manufacturing processes and heavy outlays for modern plant and equipment will be required to achieve adequate profit margins should there be a continuation of inflationary wage settlements.

(3) Provide new productive facilities. Increased manufacturing capacity will be required as markets for finished products expand. Even greater capital outlays will be needed to build and equip facilities to produce new products resulting from intensive research and development programs throughout the industry.

(4) Develop new and improved products to increase customer demand and to assure for the rubber industry an increasing share of the consumer dollar.

(5) Improve the American competitive position with foreign imports, now seriously threatened due to the rising dollar differentials between U.S. and foreign wage levels.

J. W. Keener

President, B. F. Goodrich Co., Akron, Ohio

Natural is looking forward to contributing to a rubber economy that would seem to be stretching no where but up.

H. C. Bugbee

During 1959 the natural rubber industry produced some 2,010,000 tons (1958 production: 1,957,000 tons); and sold to a natural rubber hungry world about 2,080,000 tons (1958 sales: 1,982,500 tons). This is the second successive year that natural has sold more than it produced. During 1958, some 25,000 tons of natural had to come from stocks to supply world overdemand. The 1959 leap in deficit to about 70,000 tons was alleviated somewhat by the approximately 15,000 tons sold from the American and English stockpiles; 8,000 tons from the U.S., 7,000 tons from England.

In the U.S., as in the world, the natural rubber growers considerably upped their sales. Against the 1958 figure of 484,492 tons, 1959 sales jumped to about 555,000 tons. This upward trend is foreseen as continuing in 1960, with American sales this year expected to reach 560,000 tons.

During 1960 also, natural rubber is expected to maintain its upward movement in worldwide production and consumption. For 1960, natural will raise its production totals to 2,050,000 tons; not enough, however, to catch up with a world consumption that will go to approximately 2,085,000 tons. This projected 35,000-ton deficit will make it three years running that natural production has been unable to overtake the continuing rise in world demand for nature's elastomer.

In 1960, however, the American and English stockpiles will be a factor in the world natural rubber supply. During September, 1959, both the United States and Great Britain announced forthcoming disposal of part of their natural rubber stockpiles. The U.S. noted that it would sell some 470,000 tons at the rate of approximately 50,000 tons a year; Great Britain that it would market some 100,000 tons on a formula related to market price.

Both countries stressed that sales would be regulated so as not affect the rubber-centered economies of Malaya, Indonesia and the other Southeast Asian countries that grow over 95 per cent of the world's natural rubber. Exactly how much stockpile rubber will be put on the market during 1960 is not known. Whatever the amount, it will add just that much to the total of natural available—will help balance the supply-demand picture that for the past several years has tended towards increasing shortages of natural.

To help alleviate these shortages in the future, the natural rubber industry of Malaya for a number of years has been engaged in a heavy replanting and new planting program. The average yield in Malaya today is 490 pounds per year per acre. The new stocks now being planted produce from 1,500 to 2,000 pounds per year per acre.

By the end of 1959 it is estimated that well over a third of Malaya's approximately 3,500,000 rubber acres will have been planted with this high-yielding rubber. Currently, this new rubber is going in at the rate of about 150,000 acres per year. Every effort is being made to increase these totals, both by encouraging replanting and opening new areas to rubber production. The Malayan government is urging that 1,000,000 acres of virgin jungle be converted to the growth of rubber.

Early in 1960, a technical service will be inaugurated in the United States. For the first time, American rubber manufacturers will have available to them technical advice that will reflect the many advances developed in natural laboratories all over the world. A similar technical service has proven very successful in England and other countries abroad. It is expected that it will prove equally helpful here.

For 1960, consumption of natural and synthetic combined is estimated at some 3,780,000 tons. By 1965, a number of economists in the rubber industry have forecast totals going beyond 4,500,000 tons. By replanting so as to produce more rubber—more cheaply, and by researching to make the rubber more useful in more ways, natural is looking foward to contributing to a rubber economy that would seem to be stretching no where but up.

H. C. Bugbee

President, Natural Rubber Bureau, Washington, D. C.

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Rubber consumption in this country should set a new record of 1.62 million long tons in 1959, and increase to about 1.65 million in 1960.

H. E. Humphreys, Jr.

Rubber industry sales are expected to set a new peak of 6.2 billion dollars in 1959, and another new high of approximately 6.6 billion dollars in 1960, when more than half-a-million tires will pop out of the molds each working day. The record volume of business will be sparked by rising passenger tire replacement sales and the favorable prospects for 1960 automotive production.

The industry expects to sell approximately 127 million tires of all types next year, compared with about 118 million tires in 1959. To achieve these record sales, the industry must produce tires at the rate of more than half-a-million on each of 250 working days. With about 1.5 million more cars on the nation's highways, replacement passenger tire sales should set a new mark of 68 million units next year. This compares with 65.5 million units in 1959.

Original equipment tire sales in 1960 should show a sharp gain because it is estimated new car production will total 6.6 million units, and may go higher, compared with 5.5 million units in 1959. Higher automotive production will also spur sales of non-tire automotive products. The automotive industry buys approximately 12 per cent of the rubber industry's output.

Truck and bus tires sales are expected to reach 15.2 million units in 1960, compared with 15 million in 1959. Of this total approximately 9.6 million tires will be for replacement and the balance for new trucks and buses and for export. Sales of farm, aircraft, and industrial tires are also expected to be at or near record levels.

Rubber consumption in this country should set a new record of 1.62 million long tons in 1959, and increase to about 1.65 million in 1960. Approximately two-thirds of this consumption will be synthetic rubber and the remaining one-third natural.

U. S. Rubber will help set the industry pattern. It now appears that our sales in 1959 will rise to a new record of over 950 million dollars, and 1960 looks even better. Capital expenditures for U. S. Rubber will total approximately 32 million dollars in 1960, compared with 25 million dollars in 1959, with a large percentage being used for continued modernization and to improve operating efficiency in plants.

H. E. Humphreys, Jr.

Chairman of the Board, U. S. Rubber Co., New York, N. Y.

We should all thank our Maker for one thing we will receive in 1960. One extra production day not yet lost at the bargaining table—February 29th.

Norman J. Johnson

Generally, I think the rubber industry experienced a good 1959 for which we should be grateful. Some evidence for this conclusion at this time can be found recorded in *RMA Rubber Highlights* during the year — "New Rubber Consumption Hits All Time Record of 141,020 Long Tons in January" and "March Rubber Consumption Hits Record Smashing Level of 146,815 Long Tons". While some succeeding months showed a decline, the over-all consumption was ahead of 1958. It is most important to note too that profits improved greatly. Published earnings reports of the rubber industry show this to be true for a vast majority of companies.

The year 1960 should be another good year for our industry, if: The inevitable wage demands are resolved wisely; Tariff cuts do not create a competitive monster; Pressure on a tight 45-cent-a-pound natural rubber market is eased; Those companies with present and expanded resources will continue and step up research; Federal gasoline taxes are not increased; Money at a cost economically sound will be available for expansion; We can do our part in curbing inflation; You men responsible for the high level of our industry are allowed to devote your time in running your companies—not being forced to go to Washington to defend your success, being mindful 1960 is an election year.

It is estimated the Gross National Product for 1960 will be somewhere between $510 and $515 billion. This in itself should portend a good year for our industry as well as the entire economy. We should all thank our Maker for one thing we will receive in 1960. One extra production day not yet lost at the bargaining table—February 29th.

Norman J. Johnson

President, Griffith Rubber Mills, Portland, Oregon

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We expect that mechanical rubber goods produced with fabric strength members will increase in volume and in number of items very considerably.

Charles F. Thomas

The volume of fabrics supplied to the rubber industry in 1959 has far surpassed the 1958 figures—and 1958 was considerably better than 1957 for the textile mills. A very healthy situation exists today. The textile industry has adjusted its production to conform to the demand and no oversupply is in evidence although additional production capacity is still available.

We expect that mechanical rubber goods produced with fabric strength members will increase in volume and in number of items very considerably. This is not unguarded optimism. It must be confessed that for many years we have enthused over the possibility of increased usage of conveyors for savings in manpower and for lower costs, only to find that the potential failed to materialize. Now, however, with new, revitalized efforts in the direction of passenger conveyor belts, and for labor savings through materials-handling belts, we believe the rubber industry will greatly increase its sales of conveyor belts and convert much of our hope into actuality.

Underground mine belting is experiencing some rather radical changes. We in the textile industry can greatly assist the rubber industry in meeting the competition presently confronting the mine belt producers and are presently engaged in a full effort to this end. The radical nature of the new competition in mine belts makes it necessary for mine belt producers to revise their thinking, and re-equip plants to produce more economically the belting which will be demanded by coal mine operators. The textiles are available.

In the past the highly competitive rubber industry, because of certain weaknesses in merchandising methods, created a situation which caused profit margins to be reduced to the vanishing point on wrapped hose, belting, fire hose, and some other lines. It is to be expected that better conditions will be created by better marketing, better research and by better merchandising—and by selling quality rather than price. The writer feels there is room for considerable optimism about business in 1960.

Charles F. Thomas

Vice-President, Turner Halsey Co., New York, N. Y.

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Risk capital made this great country what it is. Lack of it can only lead to socialism or worse.

C. P. Hall

Once again, as for many successful business years, in 1959 "Taxes were our most important product"—with apologies to General Electric for the paraphrasing. I will have to go along with the crowd in predicting that we are in for a boom period and general business conditions will be bullish for 1960—up, up and up, unless basic industries become strike crippled. No doubt, with the feeling of prosperity in the air, everybody, Congress included, will feel free to spend more money and increase their indebtedness which will make for more "gentle inflation"—gentle like the tiger cub that inevitably one day comes of age. Personally, I would feel much better if we could somehow manage to slow up just a little and balance the budgets of our federal, state, county and city governments.

Technological developments in the rubber and plastics industries invariably call for new chemicals to bring out the most desirable characteristics of new elastomers and plastics and the need for more and continued basic research will always be with us.

I have no concern for the immediate future—1960 portends to be rosy, indeed. We are being made increasingly aware, however, that soon millions of people will be added to the working age population for whom billions of dollars must be spent in capital investments to provide job opportunities. Tomorrow's risk capital—needed in billions of dollars—cannot be provided from "Profit After Taxes" by corporations or individuals. Risk capital made this great country what it is. Lack of it can only lead to socialism or worse.

C. P. Hall

President, The C. P. Hall Co., Akron, Ohio

I should expect 1960 to prove the most prosperous year for the British rubber industry since the phenomenal peak of 1955.

Stuart C. Covell

Last year again saw a substantial increase in the total production of the rubber manufacturing industry in Great Britain. Much of the increase no doubt had its origin in the continued prosperity of the motor industry—sales of tires for original equipment, for instance, were something like 20 per cent above the level of the previous year. Moreover, 1959 made history by the adoption of an all-rubber suspension for the new and highly successful British baby cars—the Morris Mini-Minor and the Austin 7. Nor was progress confined to tires and car parts. There was increased production also among general rubber goods, notably rubber flooring, rubber and resin-rubber soling materials, and latex foam.

Unfortunately, the benefits of higher production were to some extent offset by the inflated price of natural rubber, which neither the rapidly-increasing world production of SBR nor the decision to run down or sell off the U.S.A. and U.K. stockpiles have yet managed to bring back to reasonable levels. Inflated prices of this sort are good for no one. They are particularly disadvantageous to the British manufacturer who for technical as well as historical reasons still uses a much higher percentage of natural rubber than is now normal in America. But in the long run they are bad also for the producers themselves, since ground once lost to synthetics is not easy to recover, even if the price differential ceases to operate.

We must hope, therefore, for everyone's sake, that the bubble will soon be pricked; and if conscious restraint on the part of buyers, or the overt manipulation of stockpile releases can help to this end, we should not be deterred on doctrinaire grounds from using such weapons as we possess. Granted a return to reasonable prices for natural rubber I should expect 1960 to prove the most prosperous year for the British rubber industry since the phenomenal peak of 1955.

Stuart C. Covell

Director, Federation of British Rubber and Allied Manufacturers, London, England

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Expanded research in hard rubber plus a revitalization and modernization of sales and marketing concepts by the industry can and will create a healthy future for the industry.

N. H. Tuthill

I find it difficult to speak for the hard rubber industry because there are no statistics available, either for the industry as a whole or by individual companies. While this is unfortunate, it is to be expected because of the nature of the industry. There are, of course, thousands of products made of hard rubber covering many areas of the consumer, industrial and chemical fields. In addition, there is no uniformity among types of producers. There is, for example, our company which covers almost the entire field of hard rubber products plus various plastic products; then there are several companies that cover limited hard rubber product lines; others that make only one hard rubber product; and finally the rubber industry giants which produce some hard rubber products along with their vastly larger soft rubber lines. Therefore, comments about the hard rubber industry must be based on scattered information of other producers and our own experience of 1959 and forecasts for 1960.

The year 1959 has been exceptionally fine for some categories of the industry and has been disappointing for others. We have found wide variations in our own case, but the over-all results for the year have been even better than the optimistic forecast we made at the end of 1958. As in some other parts of the rubber industry, however, the hard rubber manufacturers are plagued with the problem of constantly increasing labor, material, and other operating costs that cannot be adequately compensated for in higher selling prices because of the strong competitive forces, both within the industry and from other plastic materials. Profit improvement has therefore had to come primarily through increased sales volume and increased efficiency.

In view of the general optimism for improved business for 1960 and knowing our own situation, we are planning a continued growth in sales volume this year and I believe most other hard rubber producers can do the same. The continued squeeze, however, between higher costs and tight competitive selling prices will make the attainment of a comparable increase in profits a very difficult problem to solve.

We have been pleased to note the tendency of engineers in some customer areas to return to the known high quality and economy of hard rubber after unsuccessful experiments with other plastics. My personal belief is that expanded research in hard rubber plus a revitalization and modernization of sales and marketing concepts by the industry can and will create a healthy future for the industry at least for those individual companies alert to the challenge.

N. H. Tuthill

President, American Hard Rubber Co., Butler, N. J.

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The volume and use of scrap rubber should be considerably higher than in 1959.

Ben Gordon

As the year 1959 draws to a close there is very little encouragement for the dealers and accumulators of scrap rubber as far as consumption and price structure is concerned. The situation has been adversely affected, of course, by the long steel strike with subsequent curtailment of production in very many industries.

Deliveries of mixed tires for reclaiming purposes are still being scheduled by the reclaimers. With the continuing limited use, the demand can be met at present levels without too much difficulty—from nearby points. However, should the demand increase to any extent, necessitating shipment from distant areas where higher freight rates are in effect—then, of course, higher prices would have to be paid by the reclaimers for such shipments.

The demand for several grades of scrap rubber accelerated about mid-year, thereby resulting in higher prices. Some grades were for shipment to domestic reclaimers while others were for export. Should the export requirements be increased

and domestic demand for split parts be increased, considerable difficulty could occur in meeting commitments—since splitting operations have been curtailed . . . particularly as present accumulations are exhausted.

The slight changes made in the recently published Reclaimers Specifications have not greatly altered the previous specifications, and it is not anticipated that they will create any hardship.

The growing usage of plastic in the manufacture of various items throughout industry generally will doubtless greatly effect the consumption of scrap rubber, hitherto used exclusively in certain products. However, in view of the predictions of a banner year in the automotive as well as unrelated industries, the volume and use of scrap rubber should be considerably higher than in 1959. Although, we repeat: not too great a change in the price levels of most items is anticipated. Generally speaking, it seems to be the considered view of most economists that we can all be highly optimistic as to the conditions which will prevail through the year 1960.

Ben Gordon

President, Scrap Rubber & Plastics Institute, NAWMD; Sales Representative, A. Schulman, Inc., Akron, Ohio

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The Canadian rubber industry looks forward to additional progress in 1960 in spite of growing concern about the upward trend in import competition.

Greig B. Smith

Although final figures are not yet available, it is apparent that the Canadian rubber industry, as a whole, operated at a record level in 1959. Consumption of new rubber reached a new peak at about 100,000 long tons compared with 83,804 tons in 1958 and 91,458 tons in 1956, the previous record. The proportion of synthetic rubber to total new rubber rose slightly to 56.3 per cent from 55.6 per cent in the previous year.

The improvement in volume was distributed over most branches of the industry. The tire division enjoyed a record year with total production of automotive and farm tires nearing 9,500,000 units against 7,800,000 units in 1958 and a previous high of 8,327,000 units in 1956. In response to an upward turn in general industrial activity, the mechanical goods division also achieved substantial increases in production of all major lines except packing.

The footwear division, however, remained extremely depressed by an ever-rising flood of import competition, mainly from Japan, Hong Kong, India and Czechoslovakia. In 1959, importers captured more than two-thirds of the market for rubber-soled canvas shoes and nearly one-third of the market for waterproof rubber footwear.

Probably the most significant development of 1959 was the start of construction of branch plants in the western province of Alberta by two leading tire companies. These are the first major rubber plants to be located outside of the more highly industrialized central provinces of Quebec and Ontario and are symbolic of the growing maturity of the Canadian economy and particularly of the Canadian market for rubber products.

With the economy in general showing a buoyant trend, the Canadian rubber industry looks forward to additional progress in 1960 in spite of growing concern about the upward trend in import competition from the relatively low cost producers of Asia and Europe. Further moderate increases in rubber consumption and in tire production are forecast and production of mechanical goods should move up with the anticipated rise in the economy in general. For the footwear division, however, the outlook remains black unless the government moves to check the destructive import competition from Asiatic and Communist European suppliers.

Greig B. Smith

Manager and Secretary, Rubber Association of Canada, Toronto, Ont., Canada

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1960 should see the continued growth of the all important consumer buying confidence, a confidence that will not only brighten the picture of our general economy, but also that of the SBR industry.

J. E. Miller

Although the year 1959 saw several strikes that directly affected sales to the SBR consuming industry, synthetic rubber demand exceeded all original forecasts. 1960 should see the continued growth of the all important consumer buying confidence, a confidence that will not only brighten the picture of our general economy, but also that of the SBR industry.

The need for extensive research and development in the rubber industry will never diminish. In the year 1954 Goodrich-Gulf Chemicals started basic research on two new "glamour" polymers—Ameripol SN (synthetic natural) and Ameripol CB (*cis*-polybutadiene). Original development work led to pilot plant production on both oriented polymers. The SBR industry was introduced to Ameripol SN in 1956 and its reaction was every bit as enthusiastic as that of our own technical people. This great incentive has spurred our people even closer to their eventual goal—mass production of an economical replacement for natural rubber.

Late in 1958 Goodrich-Gulf began an extensive sampling program of Micro-Black masterbatch. This product is basically an adaptation of new incorporation techniques using present blacks and polymers. By the end of 1959 many rubber processors had already realized the advantages of using Micro-Black masterbatch in their production. They not only greatly improved handling operations, but also the physical properties of their finished products. The advent of black masterbatch actually represents a reduction in the price of synthetic rubber because the carbon black is intimately dispersed throughout the polymer and at the expense of the rubber producer.

Goodrich-Gulf also introduced to rubber processors a new light colored, 50 part oil-extended polymer with excellent physical characteristics. Ameripol 4700 enabled processors to reduce their raw material costs by as much as 10 per cent without sacrificing product quality. SBR producers are now conducting research and development on even higher oil-extended polymers and the results should be gratifying to processors everywhere. With constant effort directed toward product improvement, the rubber processor can look forward to a continuing supply of raw material which will be of finer quality and more easily adapted to his particular line of products. As a member of the ever expanding SBR industry, Goodrich-Gulf welcomes with extreme optimism 1960 and the coming years.

J. E. Miller

Vice-President, Sales, Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio

Key words in 1960 in the industry will be growth and diversification.

Harvey S. Firestone, Jr.

One year ago I predicted that 1959 would be the best sales year in the history of the rubber industry. From every indication, it seems certain that this forecast will be confirmed; it has already been confirmed by the biggest year in the history of the Firestone company, both in sales and profits. There is every reason to believe that the 1959 upward trend will continue into the 1960's.

It is also certain that both domestic and world consumption of rubber will reach new high marks in 1959. World consumption continues the steady upward trend of the past decade and domestic consumption will extend about 6 per cent above the previous high of 1955. Moreover, the domestic figure probably indicates a re-establishment of the steady growth trend which was interrupted by the recession period following the 1955 high.

The rubber industry will be a growth industry in the 60's. We are in the age of synthetic rubber as we enter the 1960's. In the past few years natural rubber production has remained fairly constant, and this trend will likely continue. With the definitely increasing consumption of rubber on a world-wide basis, it will be the task of synthetic rubber to meet the increasing demands. Increased domestic production and greatly increased plant capacity in foreign countries will make it possible to meet the consumption.

Currently 65 per cent of all rubber used domestically is synthetic, and with the many specialized synthetic rubbers being developed, this trend will continue and even increase. Since we have such synthetic rubbers as Firestone's Coral and Diene, which duplicate natural rubber, there is no longer need for concern about America's supply of rubber, only its uses.

The rubber industry is a dynamic one, with representative companies in the industry expanding both vertically and horizontally. In fact, key words in 1960 in the industry will be growth and diversification.

Harvey S. Firestone, Jr.

Chairman of the Board, Firestone Tire & Rubber Co., Akron, Ohio

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In 1960 at least 295,000 long tons of reclaimed rubber will be consumed in the domestic market.

T. H. Fitzgerald

Consumption of reclaimed rubber during 1959 will be about 290,000 long tons. This is substantially above the forecast of a year ago (1958) and marks the year (1959) as one of the best the industry has known. Actually this is the highest consumption in history except during a few years when new rubber was in short supply. In view of the optimistic forecasts for business in general, and especially automotive, I feel confident in predicting that in 1960 at least 295,000 long tons of reclaimed rubber will be consumed in the domestic market.

The reclaimed rubber industry feels greatly reassured by the recent pattern of usage of its product. During the past decade we have seen tremendous growth of the use of vinyls and other plastics. Also, oil extended synthetic rubber has become available at much lower cost than the original polymers. These products made rather severe inroads on some markets historically dominated by reclaimed rubber. As a result of this attrition, reclaim has been unable to keep pace with the growth of the over-all rubber industry.

Happily this situation has brought about a very healthy change in the approach by compounders to the use of reclaim. Not long ago it was considered by many as a substitute for new rubber and its value expressed in terms of cents per pound of RHC. Today, to an increasing extent, reclaim is recognized as an individual product possessing some rather unique and desirable properties. In addition to its use as rubber hydrocarbon, realistic dollars and cents values are being placed on its rule in reducing processing costs. Such advantages as faster mixing, less defects at calender or tuber, lower processing temperatures and faster cures are becoming more and more important to fabricators.

Perhaps because of this increasing awareness of its true value the decline in percentage of reclaim to new rubber has slowed markedly and seems to be approaching stability. Further, the recent modest growth in pounds consumed may reasonably be expected to continue. Having weathered the storm of intense competition of plastics and synthetic rubbers, the reclaim industry looks forward with confidence to further gains in 1960.

T. H. Fitzgerald

President, Rubber Reclaimers Association, Inc.; Manager, Allied Sales, Naugatuck Chemical Div., U. S. Rubber Co., Naugatuck, Conn.

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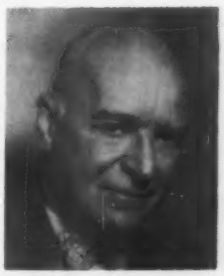

It is assumed that stockpile sales will be conducted on an orderly basis, designed to least affect the supply-demand position.

R. D. Young

The natural rubber forecast for 1960 will probably follow the pattern set during the past year, with increased consumption both in the United States and abroad, accompanied by a lesser increase in production. The statistical gap between consumption and production, however, probably will be filled, to some extent, through the sale of natural rubber from the government stockpiles of the United States and the United Kingdom, and it is assumed that such sales will be conducted on an orderly basis, designed to least affect the supply-demand position.

The membership of the Rubber Trade Association of New York, Inc., is composed of natural rubber importers, who operate both domestically and throughout the world, and agents of Far Eastern shippers of natural rubber. During the past year, in order to establish closer working relationships with collateral organizations, the membership of the Association has been expanded through the creation of an Associate Members Group, which includes steamship lines, financial institutions, transportation companies, etc. Basically,

the Association is a servicing organization, and offers to the wide-spread rubber manufacturing industry:

(1) A consistent and dependable source of supply of all varieties of natural rubber, for almost any delivery period, at a reasonable price;

(2) Aid in financing the raw material, through the extension of credit, at least until it is well on the way to a finished product;

(3) The maintenance of an adequate pipeline of natural rubber in transit from primary markets to ports of entry in the United States favorable to the location of the manufacturer, and the assurance that as sources of supply develop in new areas of the world this additional production will be made available;

(4) The benefits of long experience by skillful, dependable and sound financial organizations in satisfying the requirements of the American rubber manufacturing industry.

Late during the past year, the United States government embarked upon a temporary disposal program of natural rubber from the government stockpile, which will, in all probability, be followed by the adoption of a permanent program early in 1960, designed to dispose of all surplus stockpile rubber over a period of years, thereby creating a new source of natural rubber supply.

Insofar as the manufacturing companies which have had no government experience in either buying or selling natural rubber are concerned, it has already been pointed out that such companies, should they so elect, can participate in the disposal program by utilizing the services of natural rubber importers.

It is certain, however, that the members of the Rubber Trade Association of New York, Inc., will adjust their operations to meet changing conditions, and the rubber manufacturing industry can expect a continuation of the same type of efficient services which have been rendered over a long period of years.

R. D. Young

President, Rubber Trade Association of New York, Inc., New York, N. Y.

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1960 will see a still further marked increase in SBR latex consumption.

Arthur Nolan

The year 1959 has been a generally disappointing one for Hevea latex but a banner year for synthetic latices. While Hevea consumption of approximately 6,000 tons per month average about equaled that of the last three years, it did not participate in the growth total. During the last quarter its price rose to a high of over 50c from a low of 35c, and the year probably averaged out less than 40c. Volumes to be consumed during 1960 appear dependent upon price. At 30c to 40c considerably more can be used than at levels between 40c and 50c.

The SBR latices jumped in consumption and possibly averaged near 7,000 tons monthly. Prices did not fluctuate and were generally unchanged, ranging from 27.25c to 32c. These latices experienced a major advance in quality during the year, and a type for use 100 per cent in foam rubber was introduced. Unquestionably 1960 will see a still further marked increase in SBR latex consumption.

Latex foam experienced a very disturbing year, with selling prices on numerous items depressed to loss levels. The year end saw prices up and some relief expected from newer SBR latices and the possibility of higher urethane foam prices.

Neoprene latices increased consumption and neared the 1,000 ton per month rate, with 1960 also promising increases as current uses increase and newer ones develop. Prices were 37c to 50c depending upon type.

Nitrile latices, as they have done each year, grew in total volume and passed 1,000 tons per month consumed. While in most cases relatively higher priced than other latices, they continued to show new and expanding uses based on their unique technical properties. Prices did not fluctuate and were 45c to 54c, according to type.

Total latex usage in the U.S.A. continued to grow with very large volumes of plastic latices rounding out the rubber latices picture. Substantial advances were made with acrylic type latices and the larger volume vinyl and polystyrene latices continued at increased higher levels.

Aside from the very much newer SBR types, no startling new polymers were introduced for large volume use. While it is not expected 1960 will have available production quantities of novel, new or greatly different polymers, it is expected the year will provide new concepts, both in latex products and different polymers.

Arthur Nolan

Vice-President, Latex and Rubber, Inc., Baltimore, Md.

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Production of passenger tires for the replacement market should rise to at least 68 million units, or about 4 per cent higher than in 1959.

J. P. Seiberling

The 12 months just ahead will be recorded as the first half-trillion-dollar year for American business. By the end of 1960, Americans should be producing goods and services at a $520 billion annual rate—about $35 billion above the present pace. Only a delay in recovering from the effects of the steel strike could stop us short of this achievement.

The tire industry—Seiberling Rubber Co. included—should continue to break its own sales records. In 1960, we expect the production of truck and passenger tires to exceed 118 million units, surpassing 1959 by about 8 per cent. Production of passenger tires for the replacement market should rise to at least 68 million units, or about 4 per cent higher than in 1959. Despite the expected high business pace, production of replacement truck tires probably will dip a little, because of longer-wearing tires and greater use of recapping in the truck field.

One very bright spot will be in the sale of tire retreading materials. In 1960, this market should increase about 6 per cent above the 515 million pounds sold in 1959. But in the next four years we expect retread sales to rise at least 30 per cent from present levels.

Behind these sunny predictions for the tire industry are two main factors: Anticipated high sales of new and used cars plus an all-time high in the number of used cars on the road. With the successful introduction of more American compact cars, the automotive industry should produce close to 7 million vehicles, second only to the record high of 7.9 million in 1955.

I have to paint a less cheerful picture in forecasting earnings from tire sales in 1960, unless prices go up. An increase is long overdue because of manufacturing cost increases of the past year. For the long term, I forecast "tremendous growth" in the automotive and tire industries in the 1960 decade.

There is little doubt that we will see the greatest expansion in the automotive fields of any ten-year period in history. Factors contributing to this growth include a large population increase, the current $50 billion interstate highway program, increased leisure and vacation time, and a trend to more two and three-car families.

J. P. Seiberling

President, Seiberling Rubber Co., Akron, Ohio

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Scientific achievements and innovations will pace the diversified rubber industry to new heights in 1960.

E. J. Thomas

Scientific achievements and innovations will pace the diversified rubber industry to new heights in 1960. These scientific advances will result in continued improvement of many of the industry's products. The advances will come in a year that is expected to see rubber consumption in the United States exceed 1,650,000 long tons, as compared with an expected 1959 consumption of 1,625,000 tons.

Pneumatic tire production in 1960 has been forecast at 125,000,000, or several million more than 1959. Auto tire replacement sales are expected to total 68,000,000 in 1960, setting a new high record for the fourth straight year. Sales of passenger car tires in the U.S. replacement market will reach the 66,000,000 level in 1959, as compared with 61,570,000 in 1958 and 56,605,000 in 1957. Truck replacement tire sales will reach 9,875,000 units, a 122 per cent increase over 1940, and tractor and implement renewal tire sales will approach 2,000,000 units, seven times the 1940 mark.

Exciting new sales records over the next five years forecast an automobile registration total of 68,000,000—10,000,000 more than in 1959. Trucks are expected to number 13,300,000 in five years, marking a 12 per cent increase over the number now in use. As a result, tire and tube replacement sales in 1964 probably will exceed 1958 retail dollar volume by $300,000,000. To prepare its facilities for the decade ahead, Goodyear will have invested by the end of 1959 a record $365,000,000 in capital expenditures and expansion since 1955. Most recent of these undertakings include:

(1) A $7,000,000 tire and tube manufacturing plant now under construction at Amiens, France, 80 miles north of Paris on the Somme River. Passenger, truck and farm tires for replacement and original equipment will be produced for France and the common European market and for export.

(2) A fifth Goodyear Canadian plant at Medicine Hat, Alberta, where passenger, truck and farm tires will be produced for the Western Canada market. Tires are scheduled to roll off the assembly line by September, 1960. The plant will also produce tread rubber for the expanding retread business.

(3) A $4,000,000 expansion of earthmover tire production facilities at Goodyear's tire plant at Topeka, Kansas, which will begin soon. The expansion will increase earthmover tire capacity at Topeka substantially, but the most important reason for the move is to increase tire sizes. The largest will measure more than three feet from sidewall to sidewall and will be fitted on a rim 45 inches in diameter. Goodyear announced earlier this year it had installed tire building machinery in Akron to manufacture tires that weigh nearly two tons and measure four feet in width and 10 feet in height.

Goodyear production is benefiting from nuclear and electronic control systems that are being installed in the company's vast production network at a cost of $6,000,000. Components of the system maintain uniform thickness of tire cord fabric as it is coated with rubber, test tires for roundness and reject those that are as much as fifty-thousands of an inch off, and assure accurate tread profiles.

Partially as a result of the new production controls, these "high-precision" passenger car tires for both 1960 models and the replacement market will be in the range of one-fifth to one-fourth more durable than those built in 1959, and more than 50 per cent better than tires produced five years ago.

E. J. Thomas

Chairman of the Board, Goodyear Tire & Rubber Co., Akron, Ohio

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An orderly and definitely stated plan for disposal of surplus rubber from the government's stocks will not only effect an important savings to the taxpayer, but will also be in the long term interest of both the producers and consumers of natural rubber.

Ross R. Ormsby

The rubber industry scored a number of new records in 1959 and we expect it to do better in 1960. Extremely high levels of activity prevailed in every product segment of the industry. With 1947-49 as a base, the new rubber consumption index for tire and products jumped from 115.6 in 1958 to 136.7 in 1959, as against the previous high of 128.9 in 1955.

At the same time, an even sharper increase in activity took place in the field of non-tire products. In this area, which includes industrial rubber products, molded and extruded goods, belts and hose, packing, rubber footwear, flooring, rubber sundries, heels and soles and other items, the new rubber consumption index advanced from 159.7 in 1958 to 189.3 this year as against the 1955 peak of 180.7.

The trend indicated by the consumption indices is expected to continue on the rising curve in 1960, with the index for the non-tire products groups continuing to run ahead of the Federal Reserve Board Index of production, currently estimated at 149.0 for 1959.

In achieving this impressive level of production and in converting upwards of three and a half billion pounds of rubber into more than 40,000 different types of consumer end products, the industry provided an important market for the manufacturers of textiles and chemicals. For example, the rubber industry consumed more than a billion pounds of processing chemicals, such as fillers, curatives and stabilizers, and nearly a billion pounds of textiles in the form of cotton, rayon and nylon.

Ross R. Ormsby

President, Rubber Manufacturers Association, Inc., New York, N. Y.

From the Secretary of Commerce

► 1959 was the best yet. 1960 will be even better with both prosperity and peace growing stronger. The year ended with the economy rebounding to peak rates, pushing up the Gross National Product for the year to around $480 billion, the all-time high in both volume and value terms. The power thrust of free enterprise can lift this figure to the half trillon dollar mark in the first half of the year and to still higher levels a year from now.

I have recently returned to Washington from extensive tours to promote good will and trade in Europe and Asia. I found that favorable reactions resulting from President Eisenhower's peace mission and economic progress in many nations open fresh opportunities for American business to sell exports.

At home, a word of caution: Let us be wise and wary. Should there be excesses in credit, severe inflation and stubborn selfishness in strike deadlocks, then prosperity could be checked.

But if national interest prevails, then this year will be a period of record-breaking business activity and high employment. There will be more money, more spending, more profits and more jobs.

The Commerce Department in 1960 will take the great Decennial Census. We expect it to reveal a record population of 180 million, up 29 million since the '50 census, now growing at the rate of 3 million a year.

This amazing population expansion will continue. Savings will be increased. Business will invest the money in research and in more efficient facilities. This, in turn, will make jobs and create an abundance of new and better products. All these factors can fashion the 1960-70 decade into the most challenging and most rewarding of history.

Of course, there will be pauses and hazards as well as bright prospects and forward steps. But, if government and the public have the economic wisdom and the moral force to take full advantage of our unprecedented opportunities, the best time of our lives is ahead.

The buoyant note in the Nation's markets in 1959 was provided by the expanded purchasing power of individuals and higher investment programs of business. The flow of personal income reached a record of $380 billion in 1959, up about $20 billion or 5½ per cent from 1958. The real gains in purchasing power were also large. Farm proprietors' income was lower, but other major income flows were higher. The wage and salaries component was more than 7 per cent higher than in 1958. The income of factory employees was off somewhat during the strike months but, by year-end, was again at a new high.

Behind this favorable showing was a record volume of employment and continuing rise in per capita earnings. Total employment in 1959 averaged over 65½ million, up 1½ million from 1958. Unemployment was substantially below that of 1958, although here again the earlier anticipated improvement in the latter part of the year was not realized owing to the industrial disputes.

The full-year record for business profits is still incomplete. It is evident that the second half results were down from the peak reached in the spring of 1959, but despite the recent drag, were up substantially from the reduced level of 1958.

Business moved on to new high ground in 1959 notwithstanding the setback to the economy brought on by labor-management disputes which slowed the upward march in the latter half of the year. Gross National Product (the total value of goods and services produced in the economy) approximated a record $478 billion for 1959, according to preliminary estimates—up 8 per cent from 1958 in value and 6 per cent in "real" or volume terms.

The year's high point in activity was reached by mid-year when the GNP rose to an annual rate of $485 billion. At that time, output was pushing forward under the impetus of the strong cyclical recovery under way since the spring of 1958. Subsequently the momentum was lost as material shortages developed and the rising tide of income was arrested.

Materials supply difficulties were still a factor at year-end, but after the return of steel workers to their jobs in November, there was a rapid recovery in steel output and a resumption of volume production of automobiles and other final products affected by limited working stocks. As 1959 ended, the economy was again moving ahead under income and demand conditions which give promise of pushing us to new high ground.

Continuing shortages of key materials and unbalanced inventories—most notably steel products—were the major influence holding back the immediate expansion of business, but this impediment was being rapidly overcome as the flow of basic steel was at a new high. Plant facilities and manpower are in adequate supply for a substantial improvement in finished goods output once the pipe lines are restocked. Business is engaged in an enlarged program of facilities expansion and consumers have shown a ready disposition to buy the output of the Nation's productivity.

If business and labor stay on the job everywhere, we have every reason to expect that 1960 will be a better year for everyone than 1959.

Frederick H. Mueller

Making more flexible Urethane Elastomers with

Castor polyols

By T. C. PATTON, A. EHRLICH and M. K. SMITH

The Baker Castor Oil Co., Bayonne, N. J.

THE OUTSTANDING physical properties of urethane elastomers have led to their use in an increasing number of commercial applications. These properties are: high tensile strength, toughness, good solvent resistance, good tear resistance, high abrasion resistance, excellent ozone resistance and ease of processability. Although there are many references in the literature relating to the preparation of urethane elastomers based on polyesters *(1, 2, 3)*, little has been reported on the use of castor oil in this application, even less on the use of polyols derived from castor oil. The present article attempts to contribute to this area of research.

Castor oil, a trihydroxy glyceride, is commercially available in tank-car quantities. As formed by nature, 90 per cent of the combined fatty acids in castor oil are ricinoleic acid. This hydroxy fatty acid is an excellent, and at the same time an inexpensive, co-reactant for the preparation of urethane elastomers. The many polyols which can be derived from castor oil by virtue of this component (12-hydroxy oleic acid) permit the preparation of tailor-made polyols to give castor/urethane polymers of varied performance characteristics.

The trihydroxy structure of unmodified castor oil provides a highly cross-linked system in the urethane reaction. Compared with conventional systems, this feature should be more effective, since cross-linking is known to confer solvent resistance and dimensional stability to elastomer systems. Castor oil polyols can also be readily prepared with di- or mono-hydroxy forms to give linear structures or to provide internal plasticization, respectively.

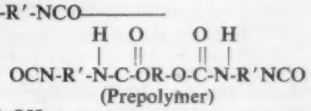
Although several commercial urethane elastomers* are now marketed which are designed for working on heavy rubber equipment, this processing approach appears to negate one of the most important properties of a urethane elastomer, namely its ability to be utilized in liquid form. Hence, our laboratory work on the use of castor polyols has been confined to liquid systems; specifically to developing economical elastomer prepolymers with extended pot lives (1-4 hours) sufficient to take advantage of this application property. Based on 1959 prices, the raw material cost for these castor polyol/urethane elastomers falls in the range of from 55 to 75c per pound.

Previous work carried out at the Baker Technical Service Laboratories on the use of castor polyols in the urethane reaction dealt with the evaluation of some 25 castor polyols in urethane coatings and foams *(4, 5)*. With this as background experience, the series of castor polyols evaluated here for use in elastomers was expanded to include a number of castor variants designed exclusively for elastomeric applications. Of this number, the nine polyols listed in Table I were found to be useful in the preparation of urethane elastomers based on tolylene diisocyanate (TDI).

Experimental Procedures

Liquid isocyanate-terminated prepolymers are first prepared by reacting excess diisocyanate with selected polyols. These resultant viscous liquids are then subsequently cured at elevated temperatures with more polyol to give finished elastomers:

(1) HO-R-OH + 2 OCN-R′-NCO ——→



(Prepolymer)

(2) Prepolymer + HO-R-OH ——→ Urethane Elastomer

*Genthane S., General Tire & Rubber Co., and Adiprene C., E. I. du Pont de Nemours & Co.

TABLE I—TYPICAL PROPERTIES OF POLYOLS SUITABLE FOR PREPARING URETHANE ELASTOMERS

Castor Polyol	Isocyanate Equivalent Weight	Approximate Functionality	Hydroxyl Number	Acid Value	Estimated Molecular Weight	Volatile Matter (%)	Density @ 25°C. (gr/cm³)	Viscosity @ 25°C. (cps)
Polycin 12	150	4.2	370	3	630	.2	.992	3,600
Polycin 52	163	2.9	340	5	475	.2	.983	900
DB Castor Oil	342	2.7	163	1	925	.02	.957	680
Polycin 59	230	2.4	240	4	555	.5	.960	475
Polycin 60	252	2.3	220	3	580	.5	.966	550
Polycin 51	186	2.3	295	6	430	.4	.962	290
Polycin 53	204	2.2	270	5	450	.5	.969	380
Polycin 23	540	1.7	100	4	920	.2	.948	390
Polycin 49	342	.9	160	.5	305	.4	.924	32

The castor polyol/TDI prepolymers (approximately 800 gram total charge) were prepared as follows: The test castor polyol was charged to a three-necked one-liter glass flask fitted with a stirrer, thermometer and air drying apparatus. From 2.4 to 2.6 equivalents of tolylene diisocyanate* per equivalent of castor polyol were then added over a one-half hour period at a rate sufficient to maintain the reaction exotherm at 50 ± 5° C. As necessary, cooling was applied to the reaction vessel to maintain this temperature. After completion of the tolylene diisocyanate addition, the reaction mass was kept at 50° C. for an additional one-half hour. No difficulty has been experienced in advancing this preparation to a pilot-plant level.

The reaction product formed (hereafter referred to as the castor/TDI prepolymer or, more simply, as the prepolymer) served as the base elastomer for further curing by a castor polyol curing agent to give the finished, cured urethane elastomer. This prepolymer is considerably less toxic and volatile than tolylene diisocyanate, but should still be handled with due precautions.

Curing was carried out as follows: The prepolymer and curing polyol were first placed separately in a vacuum oven and degassed at 50-60° C. for 10-20 minutes at 5 mm. Hg pressure. At the end of the degassing period, the vacuum was broken and sufficient curing polyol was added to the prepolymer (stoichiometric amount required to react with the residual isocyanate groups of the prepolymer) to effect the cure. For accurate work, the per cent —NCO should be determined for the prepolymer and this value should be used for calculating the weight of curing polyol to completely react with this residual —NCO content. After thoroughly mixing the reactants, the prepolymer/curing polyol mixture was re-evacuated at 60° C. for 5 minutes at 5 mm. Hg pressure. In some instances this second evacuation step was found to be unnecessary. After breaking the vacuum, the mixture was poured into heated, silicone-treated* molds, and cured at 130° C. for 2 hours. Physical properties of the cured elastomers were obtained after an additional cure period of 7 to 10 days at room temperature. As much as 5 pounds of elastomer have been successfully molded by this casting technique in the laboratory.

The curing conditions of 2 hours at 130° C. were arbitrarily selected on a basis of convenience. In general, the rate of cure for these urethane elastomers doubles for each 20° C. rise in curing temperature. Thus, the cure time is approximately 1 hour at 150° C. or one-half hour at 170° C.

Curing of the elastomer can also be enormously accelerated through the use of a proper catalyst. For example, room temperature cures can be achieved by resorting to the use of 1 per cent of the catalyst triethylene diamine** based on the total solids. In spot checks, it was found that the physical data obtained for elastomers cured at room temperature with this catalyst were either equal or somewhat superior to

* Hylene TM, E. I. duPont de Nemours & Co.; Nacconate 80, National Aniline, Div. Allied Chemical & Dye Corp.; Mondur TD-80, Mobay Chemical Co.

TABLE II—COMPOSITION AND PROPERTIES OF CASTOR POLYOL PREPOLYMERS

	Polycin U—Prepolymers		
Composition (pbw)	Polycin U-56	Polycin U-63	Polycin U-75
DB Castor Oil	62	——	——
Polycin 59	——	50.5	——
Polycin 60	——	——	52.5
TDI (80/20 type)	38	49.5	47.5
	100	100.0	100.0
–NCO/–OH Equivalent Ratio	2.4	2.6	2.6
Properties			
Color	light amber		
Viscosity (p/25°C.)	275	400	390
–NCO Content (%)	10	13.6	13.7
Equiv. Wt. per –NCO Group	420	308	306
Density @ 25°C. (lb/gal)	8.90	9.15	9.20

* MR-22-Silicone, Peninsula Silicones, Inc., or equivalent.
**Dabco, Houdry Process Co.

TABLE III—PROPERTIES OF CASTOR-POLYOL/TDI ELASTOMERS

(Cured at 130°C. for 2.0 hours, then aged 1 week before testing.)

Elstomer Coding	Composition (parts by weight)				Pot Life at Room Temp.			Physical Properties								Electrical Data (R. T.) 1-2 mil film			
	Polycin U Prepolymer		Polycin Curing Polyol		Viscosity (poise) Time (hr)			Density (gram/cm³)	Hardness (Shore A)	Low Temp. Brittle Pt. (°C.)	Tensile Strength (psi)	Elongation (%)	Abrasion Resist. (Taber H-22, 1000∞)	Linear Shrinkage Liq. @ 100°C. Solid @ 25°C.	Water Absorption (%)**	Dielectric Constant	Dielectric Strength (volts/mil)	Power Factor 60∼ (Relative Values)	Volume Resistivity ohm-cm 10^{15}
	No.	%	No.	%	0	1	3												
4	U-56	73.5	#12	26.5	200	590	——	1.085	97	— 5	2170	70	.14	—	—	6.3	500	3.4	640.
2	U-56	71.5	#52	28.5	91	210	540	1.080	80	—70	1275	150	.23	—	1.1	4.6	265	8.8	.38
3	U-56	66.0	#53	34.0	5	130	320	1.062	52	—70	320	140	.13	1.9	1.0	3.7	155	9.2	.18
																4.0*	700*		73.*
1	U-56	68.5	#51	31.5	5	130	280	1.065	45	—45	300	210	.13	—	1.2	2.3	110	3.5	.022
7	U-56	54.0	DB	46.0	45	86	200	1.042	55	<—80	170	70	.05	1.6	.8	4.4	200	2.5	.75
																4.8*	550*		130.*
5	U-56	42.5	#23	57.5	24	37	62	1.017	28	—55	30	60	.25	—	.8	—	—	—	——
14	U-63	65.0	#52	35.0	48	200	600	1.102	93	—20	2750	175	.53	2.4	1.4	5.8	600	2.5	470.
																3.2*	800*		1600.*
15	U-63	59.0	#53	41.0	40	92	340	1.083	48	—45	1050	270	.40	2.5	1.2	5.0	280		1.3
																3.5*	650*	8.8	62.*
13	U-63	61.5	#51	38.5	18	56	200	1.082	41	—20	875	400	.19	—	1.4	—	—	—	——
19	U-75	65.5	#52	34.5	66	180	520	1.099	87	—30	2500	120	.43	—	—	5.4	650	3.8	130.
20	U-75	60.0	#53	40.0	34	120	620	1.082	49	—45	1275	210	.28	2.1	1.2	5.7	760	8.2	110.
18	U-75	62.0	#51	38.0	28	90	370	1.082	38	—35	925	330	.34	—	—	—	—	—	——

* 20 mil film. ** 4 days at 90°C. with 100% R.H.

those obtained using the two-hour cure without catalyst at 130° C.

Curing with Castor Polyols

For the purpose of simplification, results and discussions will be limited to data obtained on elastomers derived by curing three urethane prepolymers (Polycins U-56, U-63 and U-75) with six selected castor polyols (Polycins 12, 23, 51, 52, 53 and DB Castor Oil). The use of the letter U following the Polycin name has been employed to designate castor polyol/diisocyanate reaction products. This device serves to differentiate such products from unreacted castor polyols. The three castor polyol prepolymers were prepared according to the method outlined above; their composition and properties are given in Table II.

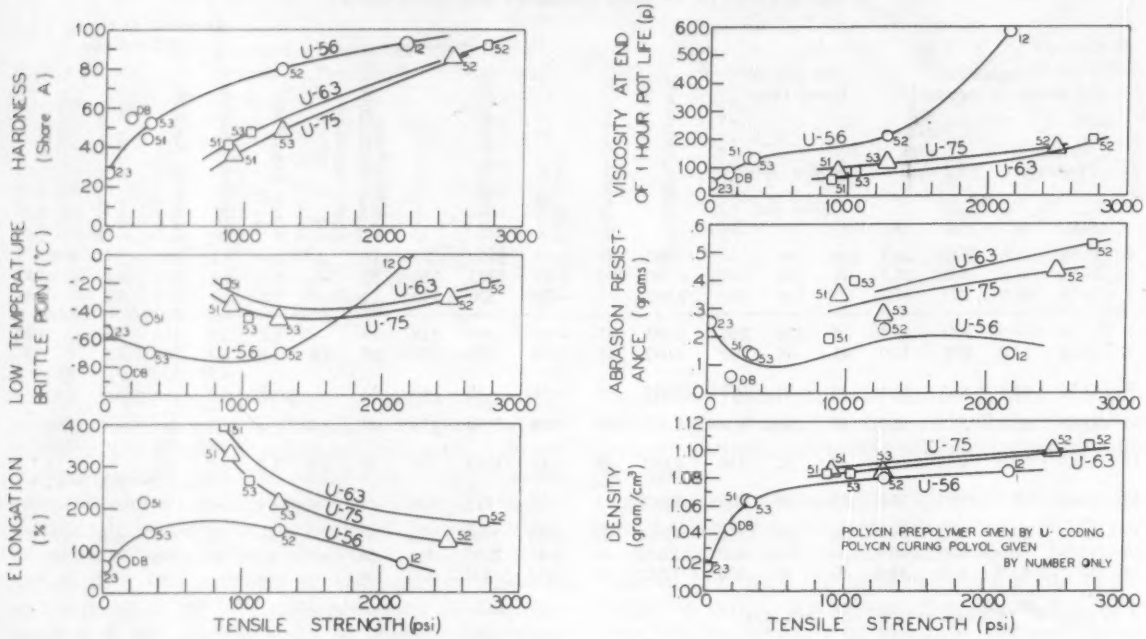
Performance studies were initially carried out only with the Polycin U-56 prepolymer. Although the elastomers based on Polycin U-56 proved satisfactory for the preparation of potting and encapsulating compounds, adhesives and printing rolls, it was felt that the possibilities of elastomers based on castor polyols were not being fully explored with this prepolymer. Hence, further research led to the development of two additional prepolymers, Polycins U-63 and U-75, which permitted the preparation of elastomers with nearly twice the tensile strength and elongation, and with markedly improved toughness and tear resistance.

The properties of twelve of the more interesting elastomers prepared from the three Polycin U-prepolymers are given in Table III. In this tabulation, the elastomers prepared from any given Polycin U-prepolymer are listed in descending order of tensile strength. This order was also found to coincide approximately with functionality of the castor polyols used to cure the given prepolymer. A summary of the test methods used in this investigation is given at the end of this article.

To better picture the interrelationships among the twelve elastomers, certain selected performance properties, as given in the tabulation, have been plotted against tensile strength in the figure. The relationships shown by the graphs are largely self-evident. Trends in performance of selected prepolymers and curing polyols are readily apparent. Thus, for any given tensile strength, (1) hardness increases in the order U-75, U-63 and U-56 (prepolymer selection) or 51, 53, 52 (polyol selection); (2) elongation increases in the order U-56, U-75, U-63 (prepolymer selection) or 52, 53, 51 (polyol selection); (3) abrasion resistance increases in the order U-63, U-75, U-56 (prepolymer selection) or 51 (or 53), 52 (polyol selection), and (4) pot viscosity at the end of one hour increases in the order U-63, U-75, U-56 (prepolymer selection).

Since the castor polyols and the castor prepolymers are all mutually compatible, interblending is possible to obtain intermediate properties as demanded of the elastomer. For example, Table IV shows the effect of blending Polycin 51 (functionality of 2.3) with Polycin 49 (functionality of .9) on physical properties, when the blends are used to cure Polycin U-56.

Properties of Castor Polyol/TDI Cast Elastomers



In this case, the objective was to obtain a cast elastomer with hardness of about 20 for preparing a printing roll composition (given in middle column).

The cast elastomers exhibit little shrinkage on converting from a liquid at 110° C. to a solid cured product at 25° C. From density measurements made on the liquid and solid states, it has been calculated that this linear shrinkage without filler generally falls in the range of 2.0 ± .5 per cent. In the preparation of printing rolls, the shrinkage of the cast elastomer has been found just sufficient to permit release from the accurately machined molding tubes. For harder elastomers, the cast product as prepared in small molds in the laboratory has been found to give an exact replica of the mold with little discernable shrinkage.

Since castor based urethanes generally are notably water resistant, it was not unexpected to find the water pick-up of these elastomers to be relatively small (on the order of 1 per cent when exposed to saturated humidity conditions at 90° C. for 4 days). At room temperature, the elastomers exhibit no volume change at all after immersion in water for 7 days. This also holds for elastomers immersed for 7 days in 10 per cent solutions of hydrochloric acid and sodium hydroxide, respectively, attesting to the excellent chemical resistance of these products. The solvent resistance of the twelve elastomers to aliphatic products (petroleum oils, heptane) and hydroxyl-containing materials (ethanol, ethylene glycol) is excellent, with little or no linear change in dimension occurring at the end of 7 days of immersion at room temperature.

With aromatic solvents (xylene), oxygenated solvents (acetone) and chlorinated solvents (perchloroethylene), linear swell at room temperature after 3 hours of immersion is found to be considerable in most cases. Swelling results with typical solvents as noted above are given in Table V. If these swelling data for any given solvent are plotted against elastomer hardness for elastomers all based on the same Polycin U-prepolymer, it is found that harder elastomers are less prone to swelling. For example, in the case of the Polycin U-56 elastomers immersed in xylene for 3 hours, there is a graded reduction in linear swell of 5 percentage units for each 10 point rise in elastomer hardness (through a 30-95 hardness range). Hence, in evaluating swelling data, it is wise to make allowances for any extreme differences in elastomer hardness.

TABLE IV—BLENDING TWO CASTOR POLYOLS TO CURE A CASTOR PREPOLYMER

Prepolymer					
Polycin U-56 (pbw)	100.0	100.0	100.0	100.0	100.0
Curing Polyol					
Polycin 51 (pbw)	46.3	41.4	36.8	32.2	27.6
Polycin 49 (bpw)	——	7.4	14.8	22.2	29.6
Hardness (Shore A)	45	35	20	8	0
Tensile Strength (psi)	300	170	45	——	——
Elongation (%)	210	190	290	——	——

In xylene and perchloroethylene solvent, elastomers based on Polycins U-63 and U-75 exhibit the least amount of swelling. However in acetone, elastomers based on U-56 and U-75 are least affected by solvent intake.

A review of the performance data for the several experimental elastomers immediately suggests potential applications for these products. For example, from a standpoint of hardness, the following end uses appear suitable as fields for exploitation. Elastomers of 85-100 hardness exhibit properties including maximum hardness, toughness and shatter-resistance. They are suitable for hammer heads, gears, drawing and press dies, molds, pump stators and impellers. This type of product calls for cast elastomers of high durometer, high tensile strength and adequate elongation. Reference to the graphed performance data suggests the use of the following urethane systems:

Preploymer	Curing Polyol
U-56	12 or 52
U-63	52
U-75	52

Properties of 65-85 hardness materials are: moderate hardness, toughness and good flexibility. They are indicated for items such as potting and encapsulating compositions, rigid gasketing, shock absorbers, valve seals, heel lifts and wiper rings. This type of product calls for cast elastomers of moderate hardness, high tensile strength, significant flexibility, along with toughness and abrasion resistance. In this instance, a polyol mixture to effect the prepolymer cure seems in order. Thus, 50:50 mixtures of two Polycin polyols on an isocyanate equivalent weight basis (as shown in the middle column of Table VI) are recommended for this application. The physical properties of the elastomers obtained from this blending technique are also given in the middle column of the table, which appears on the following page.

40-65 hardness elastomers exhibit these properties: low hardness, moderate tensile strength and very good flexibility. Items they are fitted for comprise adhesives, binders, sealants, potting compounds and laminations. Suggested urethane compositions for fulfilling the requirements demanded for this type of composition are tabulated below:

Prepolymer	Curing Polyol
U-63	51 or 53
U-75	51 or 53
U-56	51 or 53

A recent release *(6)* discusses the adaptation of this class of elastomer to the preparation of high quality sealants for building construction. For this use, an excess of cure polyol over that called for stoichiometric calculation has been found to aid adhesion and enhance overall flexibility and resilience.

Elastomers of 15-40 hardness have these properties: minimum hardness, adequate tensile strength, tear and abrasion resistance. They seem adaptable to use in printing rollers and shock absorbers. This type of soft elastomer suggests the following urethane systems as suitable starting formulations for experimentation:

Prepolymer	Curing Polyol
U-56	23 or 51
U-63 or U-75	51

Uses for Selected Elastomers

In terms of electrical properties, the following urethane elastomers would appear to merit serious evaluation:

Prepolymer	Curing Polyol	Hardness
U-75	53 or 52	49-87
U-56	DB or 12	55-97
U-63	52	93

Reference to Table III shows these elastomers to have outstanding electrical properties, suggesting their use

TABLE V—CHEMICAL AND SOLVENT RESISTANCE OF ELASTOMERS

(Per cent linear swell at 76° F.)

	Polyol		Ethylene Glycol	ASTM No. 3 Oil	Ethanol	Heptane	Xylene	Acetone	Perchloro-ethylene
			7 Days		Immersion Time 3 Hours				
No.*	Prepolymer	Curing							
1	U-56	#51	Nil	3	3	2	35	35	20
2	U-56	#52	Nil	Nil	3	1	14	19	10
3	U-56	#53	Nil	0.5	2	4	19	27	13
4	U-56	#12	Nil	Nil	0.5	0.5	7	13	8
5	U-56	#23	Nil	5	3	15	45	32	32
7	U-56	DB Oil	Nil	3	2	4	28	21	16
13	U-63	#51	2	Nil	4	Nil	18	52	15
14	U-63	#52	1	Nil	3	Nil	14	31	8
15	U-63	#53	1	Nil	2	1	13	36	12
18	U-75	#51	1	Nil	2	1	22	38	12
19	U-75	#52	1	Nil	2	Nil	10	18	5
20	U-75	#53	1	Nil	2	2	22	26	14

* This number refers to elastomer coding given in Table 3.

as potting, sealing, encapsulating and impregnating compositions.

These elastomers also lend themselves to application as coatings over paper, leather, wood, concrete, metal and other substrates. They can be applied at 100 per cent solids content or reduced with solvent to lower viscosities as desired. For coating applications, however, the use of a catalyst is recommended, such as 4 per cent methyl diethanolamine based on the solids content. Also, the curing polyol must be used to a much lesser extent—cut to about one-half the amount which would be necessary to react with all the residual —NCO groups of the prepolymer. With these modifications, coatings to meet exacting demands can be formulated. For example, a glossy abrasion-resistant coating for application to rubber goods (with an elongation of about 600 per cent) has been recently developed based on the work reported here.

Although castor polyols were used exclusively for curing the urethane prepolymers reported in this article, it should be noted that partial substitution of polyether polyols for the curing castor polyol component is sometimes expedient. Thus, the use of polypropylene glycol 1000 has been found helpful in increasing flexibility where maximum elongation is a major demand. Although the work reported in this paper deals solely with the preparation of elastomers based on castor polyols and tolylene diisocyanate, there is reason to believe that elastomers prepared from castor polyols and diphenyl-methane-p, p'-diisocyanate would exhibit even superior physical properties, although at a higher cost.

Summary

A series of urethane elastomers based on three prepolymers prepared from DB Oil and two alternate castor polyols have been prepared. It has been demonstrated that tailor-made physical properties can be built into these elastomers by proper selection of the prepolymer and the curing castor polyol. The wide range of physical properties obtained using castor oil as a relatively inexpensive source of the polyols should insure their use in numerous commercial applications.

Since the castor polyol/urethane elastomer is prepared from a low-viscosity liquid with a prolonged pot life, it is possible to cast the elastomer into intricate molds, coat it onto a substrate, or incorporate it with pigments and fillers in light mixing equipment prior to forming it into a final shape.

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(5) Ehrlich, A., Smith, M. K., and Patton, T. C., *Journal of the American Oil Chemists Society*, Vol. 36, p. 149 (Apr. 1959).
(6) "Quality Urethane Sealants," *Application Newsletter No. 46*, Baker Castor Oil Co. (Apr. 27, 1959).

Table VI—Elastomers Obtained by Blending Polyols

Polycin U-63 Elastomers			
Prepolymer			
Polycin U-63	61.5	63.25	65.0
Curing Polyol			
Polycin 51	38.5	19.25	—
Polycin 52	—	17.50	35.0
	100.0	100.00	100.0
Hardness (Shore A)	41	71	93
Tensile Strength (psi)	875	2200	2750
Elongation (%)	400	225	175
Polycin U-75 Elastomers			
Prepolymer			
Polycin U-75	60.0	62.75	65.5
Curing Polyol			
Polycin 53	40.0	20.00	—
Polycin 52	—	17.25	34.5
	100.0	100.00	100.0
Hardness (Shore A)	49	64	87
Tensile Strength (psi)	1275	1750	2500
Elongation (%)	210	165	120

TEST METHODS

Viscosity
Brookfield Viscometer, Model RVF.

Hardness
A.S.T.M. D676-58T (Shore A Durometer).

Low Temperature Brittle Point
A.S.T.M. D746-57T.

Tensile Strength, Per Cent Elongation
A.S.T.M. D412-51T.

Abrasion Resistance
Taber Abrasor, 1000 gram load, H-22 Wheel, gram loss after 1000 cycles.

Linear Shrinkage
Calculated from density measurements of prepolymer/curing polyol mix at 110°C. and of cured elastomer at 25°C.

Water Absorption
Per cent increase in weight of cylindrical specimen (½-inch diameter by 2-inch length) after 4 days at 90°C. at 100 per cent relative humidity.

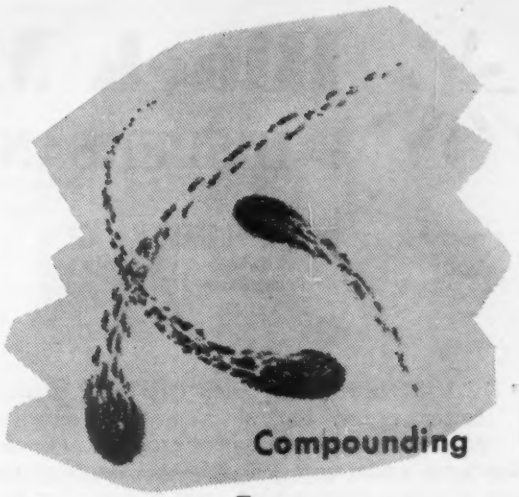
Electrical Properties
Electrical properties were determined on films of 1-2 mil thickness (cast from solvent solution at 50-75 per cent solids) and 20 mil thickness (cast from 100 per cent solids elastomer mix) prepared by the laboratories of The Baker Castor Oil Company.

The electrical performance data was obtained through the courtesy of the National Lead Company (20 mil film) and the Astron Corporation (1-2 mil film), who kindly placed at our disposal the results of their detailed experimental testing work on these films.

Southern Rubber Group

Panel Discusses

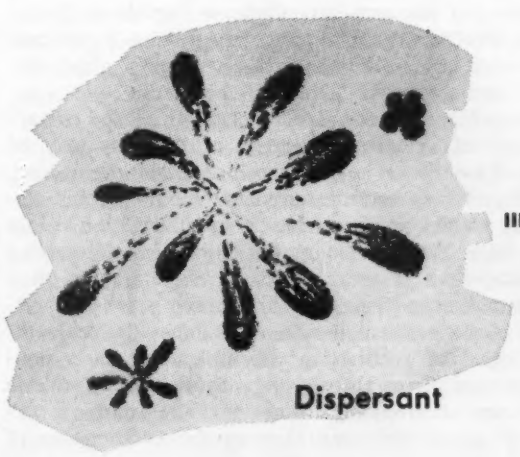
Black Masterbatches

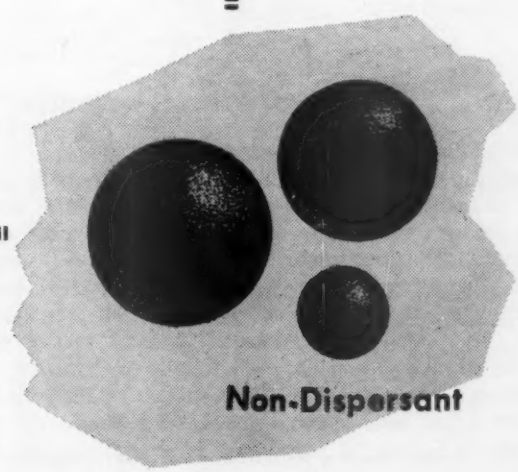


THE SUMMER, 1959, Meeting of the Southern Rubber Group devoted a special technical session to a discussion of "Recent Developments in Black Masterbatch." In response to widespread reader interest in the advantages offered by this processing innovation, RUBBER AGE is publishing the complete text of three papers presented at that time.

In the following pages, the experts note the progress which has been made in overcoming physical deficiencies of the masterbatches marketed originally in 1944. With the latest varieties of dispersant types, preparation of higher solids slurries has become possible, storage benefits increased and accuracy in changing from one type masterbatch to another facilitated. Currently these types maintain the best achievable balance among cure rate, tensile, Mooney, extrusion and flexing, as required by diverse fabricators.

Non-dispersant types, according to the speakers, have helped to eliminate large storage tanks for water dispersions of black. They have also achieved higher tensiles, resilience and elongation than dry mix control stocks, while lowering power consumption and shortening mixing times. The three papers follow herewith.





Black Masterbatches

I–DISPERSANT TYPES

By R. A. FORRESTER
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Baytown, Texas

THE HISTORY of dispersant type black masterbatches extends back almost to the start of the government synthetic rubber program. The developments which occurred were the results of the work of several producers. A great deal of effort was spent in solving the complexities of production and in meeting the rigid specifications set up by the government. Almost all types of black were incorporated into masterbatches under these same exact requirements. All of this work, done with the use of dispersing agents in the carbon black slurry, was reported in government reports. It is unfortunate that those reports were not given wider publicity, because the work served as a foundation for many of the techniques used today.

Dispersing agents are materials which serve to separate individual particles of a solid in a liquid, then keep them apart until the dispersing agent is neutralized or removed. They may be of the anionic, cationic or non-ionic active types. With carbon black, we are interested primarily in anionic agents. This means that the part of the agent which does the dispersing surrounds the carbon black particles to keep them apart by a combination of repulsive forces, both in electrostatic charge and van der Waals' forces.

True dispersing agents differ from wetting agents in that a lowering of interfacial tension does not always occur simultaneously with the dispersion. For example, soaps and detergents lower surface tension, but dispersing agents need not do so. When finely divided carbon black is put into water, the particles have a strong tendency to agglomerate or clump together. This agglomeration prevents good dispersion in the resultant masterbatch unless precautions are taken in mixing and coagulating.

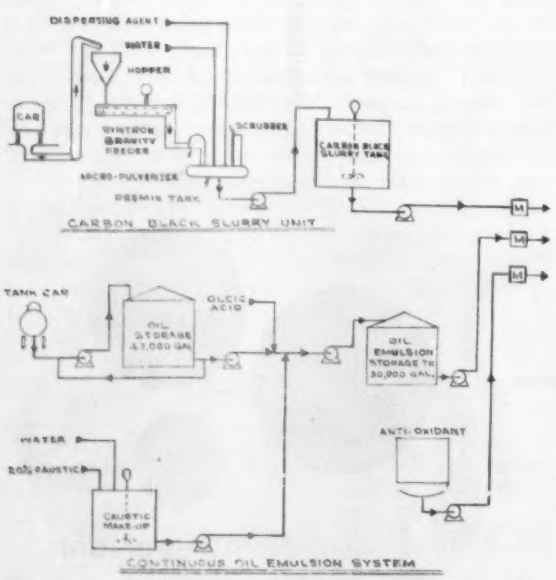


FIG. 1—Flow diagram for carbon black and oil preparation.

Characteristics of Slurry

Carbon black is hydrophobic, that is it does not mix readily with water. It is possible to whip limited quantities of it into water which acts as a carrier. The more finely ground the black, the more difficult to wet it with water. A slurry containing 5 per cent black is not difficult to make; but, as the black content is increased, the wetting rate slows down and the slurry gets thicker to the point where it almost becomes a paste.

Dispersing agents are used to permit the preparation of higher solids content slurries (19 per cent). They help to wet out the black much faster and lower the viscosity of the slurry appreciably. There has been a gradual but major change in concept as to how dispersing agents should be used. Originally about 2.0 per cent was used on the black. Today that level has been lowered to 1.1 to 1.2 per cent for HAF black. Channel black requires about 0.8 per cent, and SRF about 0.6 per cent.

From a production standpoint, another good characteristic of these black slurries is that they may be stored for several hours before use without thickening, and they may be transferred for a considerable distance to the finishing area where they are used in the latex. Finally, through the action of the dispersing agents, most of the particles of black are less than one micron in diameter. This particle size is important in the production of masterbatches. It represents a degree of subdivision which is attained in non-dispersing agent slurries only by the most extreme severity of mechanical working. The following description of the process shows the combination of

mechanical breakdown of the dry pellets preceeding the chemical action of the dispersing agent.

Manufacture of Masterbatch

Figure 1 shows the procedure, or flow of materials, in making a carbon black slurry. Pelleted black is metered to a Mikropulverizer at a closely regulated rate. This uniformity in the slurry leads to excellent control of black content in the finished product. The powdered black drops into a water-dispersing agent solution which wets it out in a continuous stream, where freshly ground black contacts a fresh solution of water and dispersing agent. This permits an even distribution of dispersing agent throughout the black. The slurry is then pumped to a large storage tank where the dispersing agent continues to separate the particles of black into a more finely dispersed system. These tanks also allow blending of slurries to reduce inequalities of black solids level.

Figure 2 shows the coagulation system. Coagulation itself is performed in a manner quite similar to that used for unpigmented polymer. The combined streams of latex, black slurry, oil emulsion and antioxidant are all metered through orifices into a blending tank. This mixture is creamed with brine and coagulated with mineral acid. The coagulation is not completed immediately; therefore, a large conversion tank is used to allow the soap in the polymer to be changed to organic acid. The surplus water is drained and filtered off, and the black crumb is washed and dried in hot-air dryers. The features just mentioned are very critical in this stage of black masterbatch production.

The nature of the coagulated crumb leaving these tanks determines how well it can be dried; and unless it is dried well, it is not a salable product. Difficulty in drying lowers output and so increases cost. One of the good features of making dispersant type masterbatches has been the convenience of the finishing operation.

Production Advantages

There are four main production advantages to the producer in the use of dispersing agents. Preparation of higher solids slurries is facilitated through faster wetting and lower viscosity with low power consumption. Secondly, this method permits storage for sufficient time to permit equalization of solids content and to avoid troubles from "upsets" in the slurry preparation system. Since a change of 3 per cent in the black feed rate leads to an off-specification product, knowledge of exact carbon black content in the slurry assumes great importance. This large storage also means convenience in movement, and metering to permit accurate control of loadings. Furthermore, the black preparation area can be relatively isolated to lessen unwanted dusting of black.

Third, a copolymer plant is not particularly suited to rapid changes in types of masterbatch production because of its large-scale continuous production.

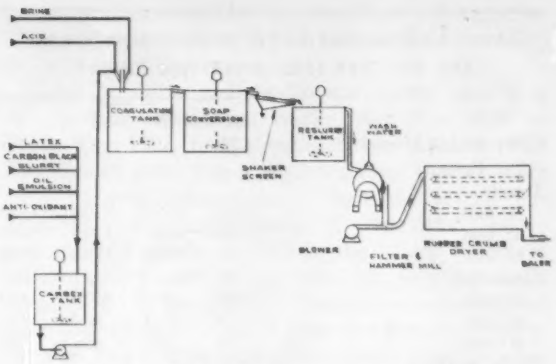


FIG. 2—Flow diagram for black masterbatch coagulation.

Change-over is slow and expensive because of downtime. The wide variety of masterbatches now marketed should probably be restricted somewhat except for specialty products. One reason for the variety of dispersant type masterbatches offered for sale has been the ease and accuracy possible in changing from one type to another. Very accurate orifice flow rates have been worked out so that loadings may be changed "on the button." This would not have been nearly so easily accomplished without the use of a dispersing agent slurry.

Finally, the actual coagulation of black masterbatch is both helped and hindered by the use of dispersing agents. It is helped in that the character of the crumb can be controlled. The crumb is larger and more easily dried than in a non-dispersant type system. Excessive use of dispersing agent, however, tends to produce a finer crumb which is more difficult to dry. This point becomes critical where higher black loadings are required, because high black means fine crumb size.

The good processing qualities of the dispersant type black masterbatch have been well established. They probably result from the initial high shear because of the black already in the batch, causing dispersion to take place faster where the shear is high. Dispersing agent type masterbatches have produced well dispersed, smooth processing stocks of a very uniform nature.

Stress-Strain and Processing

Customers usually want good processing and good stress-strain. Quite often it is necessary to sacrifice one property to obtain another. At this point it is proper to emphasize what is well known to most of you. It is very difficult to demonstrate superiority of one type masterbatch over another unless all are based on the same polymer, because the polymers themselves differ.

Table I shows how the polymers from four producers differ in stress-strain in a *dry mix* tread recipe. A 380-pound difference in modulus level and a 540-pound difference in tensile is present. To carry

TABLE I—POLYMER EFFECTS ON STRESS-STRAIN

Dry Mix (SBR-1500) Tread Type Recipe *

	Brand A	B	C	D
Compounded Mooney	55	55	53	53
292°F. Cure				
Tensile				
30 min.	3050	3150	3200	3140
45 min.	3540	3080	3390	3000
60 min.	3570	3050	3290	3320
Elongation				
30 min.	550	570	530	560
45 min.	540	470	460	470
60 min.	540	450	430	510
300% Modulus				
30 min.	1390	1400	1800	1370
45 min.	1730	1700	2030	1650
60 min.	1990	1790	2080	1700

* Compounding Recipe: Polymer—100, HAF Black—52, Hi-Aromatic Oil—10, Zinc Oxide—3, Stearic Acid—2, NOBS Spec.—0.7, DPG—0.5, Sulfur—2.

TABLE II—POLYMER EFFECTS ON STRESS-STRAIN

Black Masterbatches with Latex from Different Sources *

(1803: 50 HAF Black, 25 Aromatic Oil)

	Brand A	B	C
Carbon Black, %	29.1	27.5	27.9
Oil, %	14.5	14.9	14.2
Cured @ 292°F.			
Tensile			
25 min.	2630	3530	3720
50 min.	3330	3670	3790
100 min.	3320	3630	3460
300% Modulus			
25 min.	450	770	870
50 min.	1040	1080	1220
100 min.	1440	1420	1470

* Compounding Recipe: Masterbatch—140, Zinc Oxide—1.5, Altax—1.0, Sulfur—2.0.

TABLE III—EFFECT OF BLACK AND OIL LOADINGS ON STRESS-STRAIN PROPERTIES

(B-111: 75.0 HAF Black, 37.5 Aromatic Oil) *

	High Black Low Oil	Low Black High Oil
Loading:		
Black (34.0—36.5)**	36.2	34.6
Oil (16.6—18.7) **	16.2	18.6
Total	52.4	53.2
Compounded Mooney	66.5	56.0
Cured 50 min. @ 292°F.		
Tensile	2940	2980
Elongation	420	550
300% Modulus	2190	1530
Hardness	59	55

* Compounding Recipe: Masterbatch—154.5, Zinc Oxide—1.5, Sulfur—2, Altax—1.
** Product Specification.

TABLE IV—STRESS-STRAIN VALUES OF MASTERBATCH WITH AND WITHOUT DISPERSING AGENT

(B-123: SBR-1500, 50.0 HAF Black, 9.0 Oil)

		Without DA	With DA	Dry Mix
Black Loading (31.2)		31.0	30.8	30.5
Oil Loading (6.25)		7.2	6.3	6.2
Cure @ 292°F.	Min.			
Tensile	15	920	1080	710
	30	3210	3200	3430
	45	3170	3230	3380
	60	3390	3580	3470
Elongation	15	910	900	950
	30	620	680	650
	45	550	570	550
	60	550	590	550
300% Modulus	15	280	330	210
	30	1360	1150	1200
	45	1630	1430	1450
	60	1660	1530	1550

that study further, *black masterbatch* made from three latices of different producers, but supplied as being of the same type, is described. Table II shows that here again the products differ as a function of the latex. A 420-pound modulus difference and a 460-pound difference in tensile are present on the 25-minute cure.

In addition to differences in latex, there can be differences due to the quality of oil and black within any given type. In Table III we note the effects of changing loadings in black and oil. The uniformity of loading in dispersant type masterbatches has always been a point of particular concern to the producers because deviation in these properties causes a rapid change in stress-strain properties. These values range from the low to the high side of the prescribed values used in control of plant production. They have no effect on tensile, but an appreciable effect on modulus and on hardness. We can also see a very decided effect of these loadings on Mooney. Higher black stiffens the stock, hence it is not a desirable way to obtain the high modulus. It is often true that a masterbatch which shows unusual properties, either good or bad, should be examined for loading discrepancies.

Quality Comparisons

Regarding the effect of dispersing agents on cure, it is apparent from Table IV that the masterbatch with dispersing agent is not appreciably different from a dry mix or a dispersant-free mix. These stocks are plant mixes accelerated for a 20-minute Bagomatic cure. The effect is quite small in relation to some of those shown in previous tables. Dispersant type masterbatches, as now produced, generally show a fast rate of cure.

Conflicting customer requests are now coming to the masterbatch producers specifying Mooney, modulus and tensile. It is apparent from previous tables that competitive materials cannot be compared until black loading, polymer Mooney, and oil extender level and type are all equivalent.

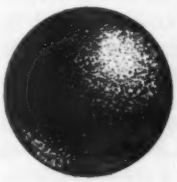
A good dry mix has always been considered as the standard for comparison with black masterbatch. All the masterbatch advantages of cleanliness, storage

TABLE V—WEAR RATINGS DURING 1956 - 1958

	Type	Rating Dry Mix = 100
December 1956	1600	95.5
	1601	96.0
	1602	100.0
	1801	95.0
August 1957	1600	99.0
	B-123	100.0
October 1957	1600	100.0
	B-123	98.5
January 1958	1600	101.0
July 1958	B-123	99.0

and processing are discounted if quality is not equivalent as measured by tread wear, cracking and overall performance. On the other hand, any superiority of masterbatch over dry mix should be considered as extra benefit or bonus.

Table V shows a chronological record of testing on standard commercial stocks from late 1956 to 1958. The 1956 results outlined the problem. The later figures show values obtained after putting more effort on wear improvement. There are several approaches to the improvement of tread wear. Those will undoubtedly be applied in the future to obtain better performance, to continue the progress made since 1956. Other criteria of quality are considered to be as important as tread wear. As presently manufactured, this type of masterbatch meets other requirements placed upon it in the best combination that can be struck between cure rate, tensile, Mooney, extrusion and flexing, as required by a variety of fabricators.



Black Masterbatches

II—NON-DISPERSANT TYPES

By M. E. SAMUELS

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DESPITE the fact that carbon black masterbatches have been on the market since 1944, they were able to claim for themselves only a relatively small percentage of that market and actually showed a decline in recent years. This has been reflected by the fact that in 1952 the polymer contained in black masterbatches represented about 14 per cent of the total styrene-butadiene rubber used. This consumption dwindled to the point where in 1957 only 7 per cent of the styrene rubber produced was in the form of black masterbatch.

There were several reasons for the relatively small consumption of black masterbatch and for the decline in that consumption. An important factor was the advent of oil masterbatched styrene rubber with its very attractive economies and satisfactory quality, which caused it to gain a large and growing segment of the market. The obvious advantage in shorter mixing time for black masterbatches was offset in some plants by their more than adequate mixing capacity. The major deterrent to the use of black masterbatches was the opinion of many in the industry that the masterbatches did not offer the desired quality in tire tread stocks which consume the largest quantities of styrene rubber.

It was long felt that this last deficiency of black masterbatches was due to the use of chemical dispersing agents such as ligno sulfonates for the preparation of the necessary dispersions or slurries of carbon black. It was theorized that the chemical dispersing agents attached themselves to the surface of the black particles, preventing adequate rubber to black bonding, and thereby reducing the physical properties of the masterbatch so obtained. Consequently, for a number of years there has been much effort toward the development of methods for making black masterbatches without the use of chemical dispersing agents. It was obvious that such a process would have to provide special means for wetting the black. The process would have to be a continuous one rather than one of making up batches of carbon black dispersions. The introduction of the black dispersion into the latex and co-coagulation would also have to be continuous.

A number of methods were tried for the grinding of carbon black from its pelleted condition to as nearly as possible its ultimate particle size, so that the black would be completely dispersed in the finished masterbatch. This included the use of such mechanical equipment as grinding mills wherein a wet slurry of carbon black beads was passed between the rotating plates of

steel, hard alloys, stone or other such materials. This method had desirable features but had one severe deficiency: there was grossly excessive wear of the grinding plates used. There were also studies of the use of chemical dispersing agents other than ligno sulfonates in the hope that they would not prevent the rubber-to-carbon bonding.

Two Novel Dispersing Methods

Then there was a major breakthrough in the development of non-dispersant black masterbatches. Copolymer Corporation developed a means of grinding and dispersing carbon black in a steam jet syphon, a small device containing no working parts. The Columbian Carbon Co. pilot planted another method for dispersing carbon black by a mechanical disperser utilizing high-energy hydraulic shear. Both of these methods started with a water slurry of carbon black beads. Basic principles discovered and utilized in these original developments form the basis for some methods of manufacturing non-dispersant black masterbatches today. Road tests of tires made with the steam jet produced black masterbatch showed them to have treadwear resistance as much as 25 per cent superior to that of dry mixed stocks. However, this method was not entirely satisfactory from a production standpoint since a significant percentage of the carbon black fed into the system was lost in the effluent.

Having established that steam was an efficient dispersing medium for carbon black, the work at Copolymer turned to the use of more efficient equipment. Starting with dry carbon black beads, a fluid energy pulverizer was next used, and masterbatches obtained with this equipment were good. Later, Copolymer adapted another type, larger capacity, fluid energy pulverizer to its process. This entire Copolymer development is covered by pending patent applications.

The Columbian Carbon Co. continued to develop the use of its mechanical disperser, and in 1957 announced its patented method to the industry. When it became known that superior treadwear could be obtained from black masterbatches prepared in the Columbian Carbon pilot plant, there was a great revival of interest in carbon black masterbatches. Shortly therafter, Copolymer installed the first continuous full plant scale production of non-dispersant type black masterbatches for commercial sale early in 1958.

It was predicted a few months ago that the growth of carbon black masterbatches in the styrene rubber field could parallel the phenomenal growth shown by oil masterbatches in recent years. Since that prediction was made, it has become evident that the growth of black masterbatches will probably exceed that of the oil masterbatches.

Steps of Masterbatching Process

As is implied by their name, the dispersant-free black masterbatching processes consist essentially of grinding and dispersing carbon black in water without the use of a chemical dispersing agent, incorporating the water dispersion of the carbon black (usually with an emulsion of a processing or extender oil) with styrene rubber latex. This is followed by co-coagulation of the carbex mixture, washing of the crumb, drying, baling and packaging in a manner similar to that used in normal styrene rubber production. The methods used for grinding and dispersing the black have taken two general forms. In a dry process, dry beaded carbon black is ground or broken up to the smallest possible particle size in equipment such as a fluid energy pulverizer and then introduced into water to form a dispersion. No further mechanical treatment is necessary to improve the quality of this dispersion. In a wet process, the carbon black beads are preslurried with water. The carbon black particles are reduced in size and dispersed in the water by either the Columbian type mechanical disperser, a wet "Mikropulverizer," a colloid mill, or a combination of these or similar types of mechanical grinding equipment.

In any case, the carbon black, oil and latex are accurately and continuously metered into a common stream, and very carefully blended. This blend, known as a carbex, is then continuously co-coagulated to form a solid crumb or particle of large enough size for adequate handling in later stages of the process. Since no chemical agent is used in the preparation of the carbon black dispersion, it is not necessary to use salt (sodium chloride) to obtain efficient coagulation of the black masterbatch. Salt is used in the coagulation of most non-pigmented styrene rubbers and some conventional black masterbatches. After the crumb has been formed, it is overflowed into a soap conversion tank, dewatered, carefully washed to remove all soluble materials, filtered and dried in conventional dryers.

Developments in the Offing

Each producer uses a process designed to suit his own respective developments and requirements. At the present time, the patent situations on each respective process are such, that details beyond those given here are not available for publication.

It is understood that work is continuing on still other methods for preparing non-dispersant black masterbatches. The research laboratory of J. M. Huber Corporation is working on a process for preparing such dispersant-free masterbatches wherein dry carbon black is added directly to the latex without making a water dispersion of the black. This process has not been evaluated on a commercial scale yet, but it offers new possibilities for masterbatches. Others are continuing work on the incorporation of carbon black directly into the polymerization recipes of styrene-butadiene rubbers.

From a black masterbatch production standpoint, there are a number of advantages and problems some of which are specific to the particular method used, others common to all of the non-dispersant methods. In the dry grinding method, a fluid energy pulverizer is relatively simple to maintain since it has no moving parts. It does a very efficient job of grinding the black and also allows a very precise control of the particle

size of the black obtained. Grinding is accomplished by having the particles of black impinge upon one another as they are whirled about in the pulverizer. Centrifugal force keeps the larger particles moving in paths in the outer periphery, while only the smaller particles can progress to the inner paths where they escape from the pulverizer. By careful control of the operating conditions and of the feed of black to the unit, only the very small particles of ground black can proceed to the next stage of the process. The black grinding and dispersing equipment used in wet processes is generally subject to more wear and tear, and raises greater maintenance problems.

Eliminating Storage Tanks

A primary advantage of the dispersant-free systems is the fact that it is not necessary to have large tanks to store water dispersions of the carbon black prior to its use. Aside from the need for less storage, it is also thought that the effect of water on the surface characteristics of carbon blacks can be a deleterious one. Therefore, short contact time with water may be of definite advantage. The exclusion of salt from the coagulation process reduces washing requirements and yields a product with much lower percentages of soluble material or ash than is found in some conventional masterbatches or in most styrene polymers.

The production of dispersant-free black masterbatches is not without its problems, however. Since all phases of the process are continuous with no opportunity to analyze batches of black dispersions, very careful control of the flow of all materials is necessary. This is accomplished by very precise continuous weighing and metering devices which are constantly checked throughout the process. Because excellent dispersion of the carbon black is a must, the efficiency of the grinding and dispersing equipment must be checked periodically. It is followed up by checks on the ultimate dispersion of the carbon black in the finished product. Furthermore, the carbon black, oil and polymer must be intimately and completely dispersed with one another. This has resulted in the need for special control tests to evaluate complete co-dispersion.

The Residual Moisture Problem

A problem that is inherent to all types of black masterbatch is that of keeping the moisture or volatile matter concentration down to a minimum. This problem has been accentuated in recent months by the end-use patterns of black masterbatches. Consuming plants have taken advantage of the easy processing and mixing characteristics of dispersant-free black masterbatches to the point where very short mixing cycles are used. At the same time, these short cycles lead to lower Banbury operating temperatures. The short mixing and lower mixing temperature may not be sufficient to work out excessive residual moisture in the original masterbatch. In later extrusion operations the volatile matter shows up as blisters or as porous cross-sections. For that reason, the long standing specification of a maximum of 1 per cent volatile matter in black masterbatches is a very unrealistic one.

It has become necessary to reduce the actual and typical volatile matter concentrations to 0.2 per cent or less. This requires very efficient drying and the application of extremely precise controls over the properties of the end product. In non-pigmented rubber, excessive concentrations of moisture can be seen by spots of white in the baled material, but this is of course not possible in black masterbatches. Automatic instrumentation has been developed at Copolymer Rubber & Chemical Corp. which examines each bale of carbon black masterbatch for moisture content even more precisely than the long standing test for metal contamination. The low and uniform moisture content thus obtained is turned into a plus factor for this type of black masterbatch.

Benefits Accruing to Processors

All black masterbatches have the common economical advantage for the end user of simplifying and reducing the number of mixing and processing operations necessary to produce stocks for final fabrication of rubber products. Black masterbatches are, therefore, very attractive price-wise to the user. The styrene rubber producing plants purchase carbon black in bulk cars or trucks at considerably lower prices than bagged black, and they purchase oil in tank car quantities. A distinct saving is passed on to those consumers who are not in a position to buy black and oil in bulk quantities. The charge made for the incorporation of the black and oil into the masterbatch is barely enough to cover actual production costs. It is certainly less than the cost of mixing in Banbury mixers or on mills, to say nothing of the capital investment necessary for such mixing equipment in the rubber plants. It is possible, therefore, for most rubber goods manufacturers to purchase the masterbatch and to prepare finished stocks more cheaply than they can purchase and process the materials separately. Incidentally, it should also be noted that the styrene rubber producing plant must process and handle approximately 160-175 pounds of product to make the same profit made on 100 pounds of non-pigmented product.

From the quality standpoint some distinct additional advantages accrue to the user of dispersant-free black masterbatches. It must be remembered that the properties of the given masterbatch will, of course, depend on the properties of the base polymer from which it is made. Generally speaking, the non-dispersant type black masterbatches show higher tensiles, elongation and resilience than dry mix control stocks, at the same time exhibiting somewhat lower modulus values. These differences will show up more significantly in factory-mixed than in laboratory-mixed stocks. From the processing standpoint, power consumption is lower on an overall basis, as well as on a peak power basis. Mixing times are shortened, but Mooney viscosity of the compounds is somewhat lower.

COMMERCIALLY-PRODUCED NON-DISPERSANT MASTERBATCHES

	Base Polymer	Black			Process Oil	Extender Oil	Producers
		HAF	ISAF	SAF	H. Aromatic	H. Aromatic	
1	1500	50	—	—	—	—	b, e, f
2	1500	52	—	—	10	—	a, b, c, d, e
3	1500	55	—	—	10*	—	c
4	1500	62.5	—	—	12*	—	c
5	1500	—	52	—	12.5	—	a, b
6	1500	—	52	—	10*	—	c
7	1500	—	—	40	5	—	b
8	1706	50	—	—	—	25	f
9	1712	60	—	—	14	37.5	e
10	1712	75	—	—	—	37.5	a, c, d, f
11	1712	75	—	—	7.5	37.5	b
12	1712	75	—	—	12.5	37.5	a, c, d
13	1708	75	—	—	—	37.5**	c
14	1712	—	60	—	—	37.5	a, b
15	1712	—	60	—	—	37.5***	a
16	1712	—	70	—	7.5	37.5	b
17	1712	—	75	—	—	37.5	c
18	1711	—	75	—	—	37.5	f
19	1712	—	75	—	12.5	37.5	a

	Base Polymer	Black			Process Oil		Extender Oil		Producer
		FEF	SRF	MT	H. Arom.	Naphth.	H. Arom.	Naphth.	
20	1502	52	—	—	12.5	—	—	—	a
21	1707	60	—	—	—	—	—	37.5	f
22	1778	75	—	—	—	12.5	—	37.5	a
23	4700	100	—	—	—	—	50	—	c
24	1500	—	75	—	17.5	—	—	—	a
25	1501	—	—	150	—	—	—	—	c

* Heavy Process Oil ** Naphthenic Oil *** Aromatic Oil

Producers: a. Copolymer Rubber & Chemical Corp. (Carbomix) b. General Tire & Rubber Co. (Gentro-Jet) c. Goodrich-Gulf Chemicals, Inc. Ameripol) d. Phillips Chemical Co. (Philprene—Philjet) e. Shell Chemical Co. ("OB-" or "S") f. Texas-U. S. Chemical Co. (Synpol).

Masterbatches Mean Better Tires

By far the largest percentage of styrene rubber and black masterbatches is used in the manufacture of tires. Consequently, most of the properties and quality advantages listed for non-dispersant black masterbatches apply to their use in tires. The same advantages carry over into other compounding areas. From the first announcement of dispersant-free masterbatches there has been a great deal of publicity in the technical journals and public press indicating the outstanding advantages of these masterbatches, as compared with dry mix stocks. A number of the claims may have appeared extravagant. However they were substantiated by actual road tests of tires made with dispersant-free black masterbatches.

Tire tests have shown improvements from 8 to 25 per cent in treadwear ratings for masterbatches made with HAF black. From 10 to 50 per cent improvement over dry mix controls has been found in treadwear ratings of black masterbatches made with ISAF blacks. Admittedly, the attainment of the uppermost values was not achieved in every case, but at least 8 to 10 per cent improvement was shown regularly. The excellent dispersion of all carbon blacks obtained in dispersant-free masterbatches has made possible, for the first time, a much greater utilization of the higher reinforcing properties of finer ISAF and SAF blacks than was possible by dry mixing. This achievement will also make possible the utilization of new types of blacks of specifically superior modulus and reinforcing properties that could not be exploited in dry mixed stocks before. Development work is under way in the preparation and evaluation of masterbatches of such new blacks.

The inclusion of additional oil as a processing aid in dispersant-free black masterbatches offers another distinct advantage to the user. It is very difficult to incorporate processing oils into masterbatches in such equipment as Banbury mixers. The rotor blades usually chop up the mix into small chunks which ride around in the oil while the batch "goes to sleep," causing the need for long mixing time to get complete incorporation. With the process oil present in the masterbatch, the need for additional oil is eliminated, thereby saving considerable mixing time and yielding far better dispersion of oil throughout the finished stocks. It should be noted that the oil added to masterbatches must be considered in two categories. In one case, the oil is an extender of the high-Mooney base polymer and cannot be considered as a processing aid. Some oil extended black masterbatches, however, do contain additional amounts of oil as a processing aid. In most of the non-extended types of dispersant-

free black masterbatches, 10 to 12.5 parts of oil are usually added as processing aids and should thus be considered in the compounding of the polymer.

Variety of Non-Dispersant Brands

Although non-dispersant masterbatches have been available in commercial quantities for only a little over a year, 25 or more different types are offered to the industry today. As can be seen on the accompanying table, some are only very slight modifications of others —a few parts difference in oil or black, for example. This lack of standardization is not helpful to the consumer since it limits interchangeability. In some cases, however, these slight differences came about because of specific consumer requests, to fit a certain compound or compounds. A continuation of the demand for additional masterbatches to fit customer requirements would work to the detriment of the masterbatch producing industry because of the difficulty of maintaining production, quality and warehouse stocks of too many types of product. This would eventually redound to the detriment of the consuming industry. Therefore, every effort must be made to standardize and reduce the number of variations on the market. This problem can be minimized if consumers use blends of existing masterbatches to obtain desired black and oil concentrations.

Black Masterbatches

III–COMPOUNDING

By RALPH T. LaPORTE
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Akron, Ohio

THE FIRST and most natural questions in the consideration of black masterbatch for one's plant are: "What will it do for my plant and my product?" "Will it cost more money?" "Can I maintain or improve quality?"

These are questions not easily answered, particularly the question of cost, since it is quite difficult in a cost analysis to include all the factors involved in changing from dry mixing to masterbatch mixing. It is a simple matter to calculate material cost, handling and transportation costs and black bonus, but the unexpected advantages may be the factors which finally tip the balance.

Advantages of Masterbatching

For instance, when we first became actively interested in black masterbatches for treads and tread capping stocks, a cold analysis indicated there might be a slight cost saving with all the known factors considered; but as long as we were disregarding mixing capacity, we felt we would rather not disturb the status quo. As our development work progressed, however, we began to see advantages we had not thought of in our first analysis: Improved appearance in our storage area, less dirt in other than mill room areas, improved morale, shorter mixing cycles than we had originally thought possible, a very definite improvement in tube machine efficiency, an improvement in the uniformity of cured physical properties, etc.

Whether or not black masterbatch will be of value in your plant depends upon many factors, but I would recommend that regardless of how sure you are of your analysis, you make a factory trial run of sufficient volume and over a long enough period of time to get the complete picture. As an example, I would point out that by changing from a dry mix procedure to the use of black masterbatch we had anticipated a reasonable reduction in mixing time, but had not expected the 40 per cent that was eventually realized. You can imagine what this meant in a mill room which at the time was operating to capacity and facing the problem of getting more production in the face of increasing demand.

Another plus factor which was not expected was the increase in tube machine efficiency. We had anticipated no change at the tube machine, feeling that a black masterbatch mix would probably be equal in tubing characteristics or maybe not quite as good as a dry mix, if we were to be plagued with the problem of moisture as we had on some previous trials. Once the change was made and the production department converted completely to black masterbatch stock, we were very happy to register a reduction in the number of off-specification treads amounting to a little over 50 per cent. We had had from 25 to 30 per cent returned stock for reprocessing at the tuber with a dry mix. On masterbatch this came down to an average of about 12 per cent. The tube machine operators had

less trouble setting up and, once they got rolling, the treads became much more uniform in profile and weight.

Using the same equipment and the same personnel, why should this be? It is my opinion that it is due entirely to the elimination of the variables attendant to the incorporation of and the dispersion of the carbon black by the dry mix method. Regardless of the care that is taken to standardize mixing procedure, there are small variables in black incorporation time, the quality of the dispersion and the temperature history of the mix, that have a definite bearing on the uniformity of processing at the tuber. These differences are so slight that they fall within the limits of our normal control laboratory standards.

Compounding on Production Scale

What about the compounding technique with black masterbatches? Basically, the application of masterbatches to existing compounds offers no problems. It has been our practice to substitute fitting rubbers and blacks and, generally speaking, with a slight adjustment of oils to reach a final formula which is either of exact composition or a practically close approximation. When we get into the factory mixing problem, it is very difficult to make any statements that would be universally applicable. Since the black is already dispersed, the temperature characteristics of a masterbatch mix are different. Cycles have to be set up with this in mind to get the full benefits of shorter cycles.

Every plant set-up is different, hence overall savings will vary with each set of conditions. It is conceivable that in some of the more modern plants it may be difficult or impossible to take advantage of black masterbatches from the standpoint of mixing output. In our plant, where a minimum cycle time of six minutes on a Number 11 Banbury batch is a negotiated labor practice, we were able to change from a two-stage dry mix to a one-stage masterbatch mix and save approximately 40 per cent in overall mixing time. Basic formulas of the comparative mixes were:

	Dry Mix	Masterbatch
GRS-1500	50.00	—
GRS-1712	68.80	13.80
Copo-3750	—	81.00
Copo-3751	—	85.00
HAF Black	56.00	—
Zinc Oxide	3.00	3.00
Stearic Acid	1.00	1.00
Wax	1.50	1.50
Antiox. & Antiozonant	2.00	2.00
Oil Activator	1.00	1.00
Accelerator	1.00	1.00
Sulfur	1.80	1.80
Oil	5.00	—
Total	191.10	191.10
Parts GRS-1500 Polymer	50.00	50.00
Parts GRS-1712 Polymer	50.00	50.00
Parts Oil—total	23.80	23.80
Parts Black-RHC + Oil	45.25	45.25

From the standpoint of product quality, it has always been theorized that the "ultimate quality" would be obtained if the carbon black were properly and completely dispersed in the rubber latex. It is my personal opinion that, as the carbon black producers and the polymer manufacturers continue their research to find the best chemical and physical characteristics for black to be used in this method, results will be obtained that far exceed our fondest hopes at the present time.

COMPARISON OF BLACK MASTERBATCH AND DRY MIX STOCKS

Type of Mix	Black Master	Black Master	Black Dry	Black Master	Black Dry
First Stage (rpm)	20	20	20	40	40
Second Stage (rpm)	—	20	20	20	20
Total Banbury Time	6½ min.	7½ min.	10½ min.	5 min.	6½ min.
Power Peak First Stage (kva)	224	208	256	448	528
Power Peak Second Stage (kva)	—	280	272	264	264
Total Power/1000 lb. (kwh)	31.26	44.87	44.89	45.19	66.53
Williams Plasticity	3.56	3.35	3.46	3.40	3.52
Williams Recovery	.33	.29	.23	.30	.25
Visual Dispersion	Good	Good	Good	Good	Good

Outlook for Higher Performance

Everyone is familiar with the progress that has been made in the last few years in the manufacture of improved quality masterbatches. Although our interest prior to these latest developments was limited due to our feeling that the quality level was not quite up to that of a good dry mix, we can definitely say this situation no longer exists. There are black masterbatches available today that will give road performance superior to any comparable formulation prepared by the dry mix method.

We have run test after test on private test fleets, commercial test fleets and mileage accounts, from which we derived the following statement: "Tread stocks made from commercially available black masterbatches, and compared directly with a like formulation by the conventional dry mix method of processing, consistently show improved resistance to fatigue cracking and show equal or better tread wear.,, I was purposely conservative in my statement as to the wear or abrasion properties of masterbatch type treads. Wear reports one hears about such a development as we are discussing range from no improvement, or actually 5 to 10 per cent poorer, to as much as 30 per cent improvement or more. Anyone who has been closely connected with tire testing can recall similar results in that field.

We have had some road test results that were equal and some that were in the 10 to 15 per cent improve-

ment range. We have seen enough tests, however, to say definitely that "average wear resistance is in the neighborhood of 5 to 7 per cent better than a comparable formula dry mixed." This, we feel, is a substantial improvement over the earlier black masterbatches and, coupled with consistently better flex fatigue, make the black masterbatch process something which cannot easily be ignored.

One of the questions which always comes up in a discussion of black masterbatch is: "What effect does black masterbatch have on power consumption and what is its power peak compared with that of a conventional dry mix procedure?" We have made a study of these factors, using both single and double stage mixing with the results shown on the accompanying table. It is interesting to note that there is no "shock" problem in the process of adding black masterbatch bales in a Banbury. Actually there is a greater power demand when slab stock is added, probably because of the easier and faster loading of slabs.

In conclusion, black masterbatches, as they can be currently manufactured, offer these advantages in varying degree:

(1) Cleaner working areas—better housekeeping,
(2) Improved processing—more uniform tubing,
(3) Reduced mixing time per unit volume of stock,
(4) Reduced power cost,
(5) Lower peak power demand,
(6) More uniform quality,
(7) Enhanced physicals—generally higher tensile,
(8) Better average service performance in tire treads.

Coming Soon . . .

Radiation Resistance of the Neoprenes—By Robert Harrington, Hanford Atomic Products Operation, General Electric Co., Richland, Wash.

The sixth in a series of articles concerns the effects of ionizing radiation on the physical properties of neoprene polymers, with comments on the potency of selected compounding ingredients.

Improved Butyl Rubber Vulcanizates—By C. J. Jankowski, K. W. Powers and R. L. Zapp, Enjay Laboratories, Linden, N. J.

How superior butyl rubber vulcanizates are obtained by replacing normal surfur loading and accelerator with sulfur donor and low sulfur-high accelerator vulcanization systems.

Structure of Dispersed Carbon Blacks—By Andries Voet and W. N. Whitten Jr., J. M. Huber Corp., Borger, Texas.

A recently developed electrical approach discloses the feasibility of a classification system for carbon blacks based on their rate of structural build-up and resistance to deflocculation.

The Theory of Rubber Elasticity—By Dr. P. J. Flory, Institute of Rubber Research, University of Akron, Akron, Ohio.

Major theoretical postulates of the rubber elasticity theory are spelled out and further investigations into structure proteins recommended.

The Temperature Coefficient Vulcanization of Butyl Rubber—By R. F. Neu, Esso Research and Engineering Co., Linden, N. J., and J. G. Martin, Princeton University, Princeton, N. J.

Two simple laboratory techniques are described for gauging the influence of vulcanization temperature changes upon reaction rates of butyl rubber compounds embodying different accelerator systems.

Radiation Resistance in Polysiloxane Elastomers—By David J. Fischer, Polymer Research Lab, Dow Corning Corp., Midland, Mich.

Experiments were conducted on a new series of polymers showing particular promise for use in radiation environment applications.

The Role of Carbon Black in the Thermal Oxidation of Polyolefins—By W. Lincoln Hawkins, Bell Telephone Laboratories, Murray Hill, N. J.

The ability, exhibited by many carbon blacks, to inhibit the free radical oxidation of polyolefins is dependent on the presence of certain reactive groups on the surface of the carbon particles. Heating in the presence of oxygen or sulfur increases the number of reactive groups to produce a much more effective antioxidant.

The Systematic Control of Rubber-to-Metal Adhesion in the Wire and Cable Industry—By R. P. Stout, Lord Manufacturing Co., Erie, Penna.

This article discusses the basic elements in rubber-to-metal bonding for wires and cables and concludes that they have much in common with factors of the mechanical molded goods industry.

PLUS R/A SPECIAL INDUSTRY REPORT

Towards More Efficient Purchasing

A round-up on purchasing techniques used by some major rubber manufacturers.

By M. G. ANDERSON
Manager, Tire Design Research
Goodyear Tire & Rubber Co.
Akron, Ohio

Precision Tire Manufacturing

through "nuclear eyes" and "electronic brains"

TIRES are as essential to automotive vehicles as feet are to people. They are the connecting links which convert engine horsepower into vehicle motion and braking torque into deceleration. In addition, tires serve to guide the car as directed by the driver and also serve to cushion the car against road shocks. Were it not for pneumatic tires, an automobile would be greatly restricted in speed and usefulness. The degree to which tires perform these functions of guiding and cushioning a car in a quiet and vibration-free manner has much to do with their quality rating as judged by modern standards.

An almost universal characteristic of the average motorist is that he will pay little attention to a random type of sound or vibration while driving. On the other hand, because today's cars are as quiet as the proverbial whisper, even a small disturbance that is periodic or recurring is disturbing to the motorist, because such disturbances are associated with an imperfection which the motorist believes will become serious. A good example of an annoyance which clamors for attention is a dripping water faucet.

A tire envelops small road irregularities and in so doing is excited in a random type of vibration known as road rumble. The average motorist thinks little of this because it is natural and expected. However, on a smooth road a small irregularity in a tire might create a much smaller disturbance but, because of its recurring nature, seem to create the illusion of impending trouble.

A tire can be described roughly as a toroidally shaped membrane containing air under pressure. The tension in this membrane, owing to the inflation pressure, excites the tire easily in vibration at a large variety of frequencies and modes depending upon the manner of excitation. In this respect, a tire might be described as a drum which gives forth varying sounds, depending upon the actions of the drummer who in this case stands for an irregularity in the tire or on the road surface.

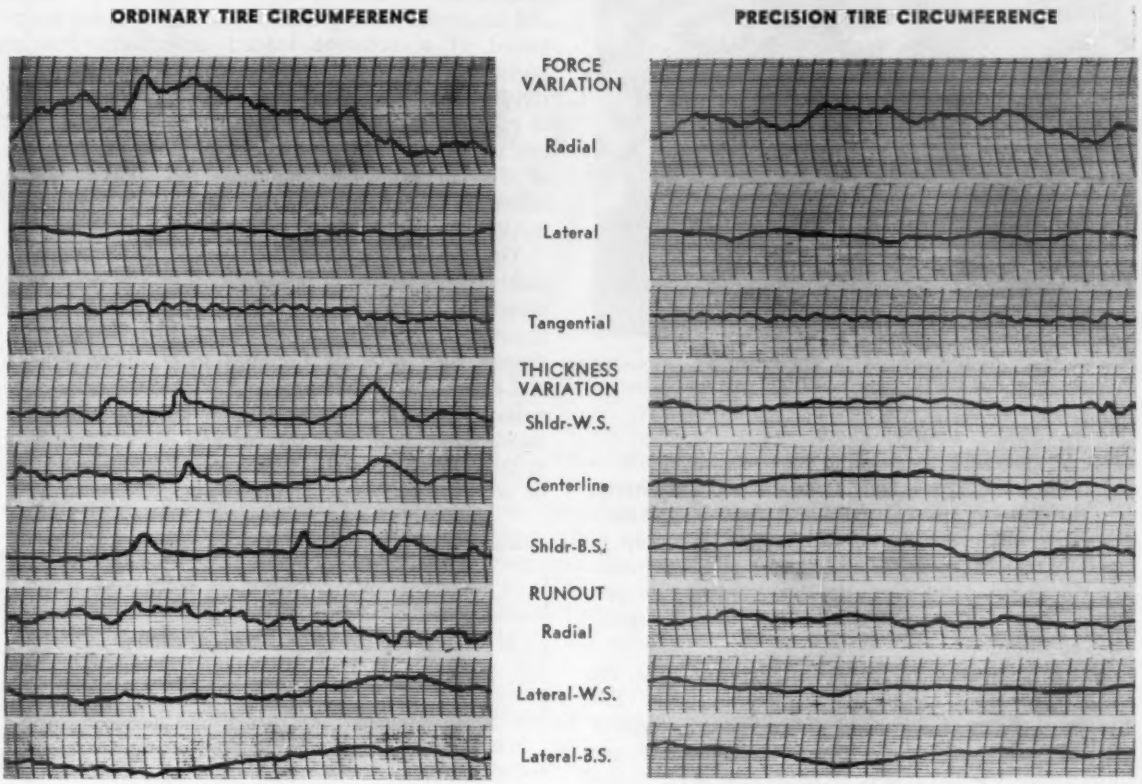
Eliminating Tire Vibrations

Some control of the tire's sensitivity to road excitation may be obtained by the use of compounds having high damping factors, but these must be used judiciously if the high speed durability of the tire is to be maintained. The type of cord and general construction of the tire as well as the design of the tread are also factors. The most difficult vibrations to control are those which are excited by the small irregularities of the tire itself on a smooth road. Due to the periodic and recurring nature of these vibrations, they may be considered objectionable even though they are of much smaller magnitude than random vibrations caused by road irregularities.

A modern car tire carrying a load of approximately 1000 pounds is designed to deflect approximately 1.0 inches under this load. In other words, each .001 inch is equivalent to 1 pound of vertical load carrying force. If a tire has a loaded radius variation of .001, the vertical force at constant deflection will vary 1 pound during one revolution of the tire.

At 60 mph, a tire rotates approximately 12 times per second. The length of ground contact is approximately 1/10 of the tire circumference, so every part of a tire tread passes through ground contact in 1/120 of a second. At this speed the inertia of the unsprung weight restricts the ability of the axle to absorb the tire variation, resulting in an impact force of 1/120 second duration acting on the tire as a drum. If the tire has a stiff spot or "radial run-out" amounting to .010 inch in deflected radius, this impact force amounts to approximately 10 pounds.

Uniformity Curves for 9.50-14 Tires



It is not difficult to understand why a 10 pound impact occurring at a rate of 12 times per second should create some disturbance in a car. On the other hand, 10 pounds is only 1 per cent of the load carried, and for elastic materials such as rubber and fabric, 1 per cent is a close tolerance. To maintain close tolerance a high degree of precision is required in tire manufacturing processes.

Electronic and Nuclear Control

High precision is expensive, and much of it would not be possible at all without modern electronic and nuclear devices. The operation of applying rubber to the cord fabric to make the plies of a tire is conducted at speeds up to 100 yards per minute, yet the thickness of the sheet of rubber applied to the fabric must be held within a variation of a few thousandths of an inch throughout both the width and length of a roll of cord fabric approximately ½ mile in length. In order to monitor the accuracy of this process continuously, radioactive rays from Strontium-90 are beamed through the rubber sheet and sensed by an ionization chamber which plots the gauge and may also be used to adjust the calender roll settings automatically.

A similar type of radioactive ray penetration device is used to scan back and forth across the roll of rubberized fabric continuously during the calendering process as a check on lateral distribution of gum. To maintain satisfactory tolerance of rubber distribution, the calender rolls must be periodically precision-ground to counteract the small amount of zone wear which occurs across the rolls.

The control of cord fabric for precision tires begins at the textile mills. Strict control of humidity is maintained in the rooms where the twisting, doubling and weaving are done. The weaving process itself is modified to produce a fabric with greater uniformity of cord spacing. Cord fabric requires an adhesive dip and heat treatment in order to form a bond with rubber. Heat treatment takes place at temperatures exceeding 300° F. and for a time period required for 1/3 of a mile of fabric in the oven process at any one time to travel at speeds up to 100 yards per minute through a complicated path involving dip tank, festoons, drying, and heating ovens.

Control of width, cord count, tension and elongation of the fabric in this dipping process requires a multitude of automatic sensing and guiding devices and extremely accurate electronic speed controls. Because cord fabric is in reality the backbone of a tire, success in obtaining the desired results in this process determines the degree of uniformity in the finished

This machine checks variations in radial and lateral run-out to make sure the tire is truly round and will run smoothly.

tire. All materials used in the construction of a precision tire must pass high standards of uniformity. It is difficult to place relative importance on the various parts. If any one part of the tire is not up to standard, the entire tire is no longer a precision product, since any small irregularity in the finished product will produce sufficient impact force to excite periodic type of vibration.

In the production of treads for precision tires, the special processing begins at the blending mills. Extrusion of the tread is done at slower speed in order to control shrinkage better at the extruding die and throughout the electronic speed-controlled multistage shrinkage and cooling tanks. No shrinkage can be permitted between the time the tread is cut to length and the time it is applied to the tire building drum. In order to obtain the required accuracy in tread length, a completely new automatic tread skiver was designed to cut an angular skived tread to a length accuracy of .1 per cent.

New Equipment, Tighter Tolerances

A major feature of precision construction involves the machines that build and assemble the various parts of a tire. New equipment was designed, such as building cores, bead setters, ply guides and tread appliers. The tolerances applicable to the tire building process were cut in half. Continuous quality control inspection was required to maintain the high standards of workmanship essential to this process.

Molds and curing equipment are standard, but the tolerances permitted in manufacture of the molds are held to a minimum. In order to increase the uniformity standard still further, precision tires are given not only the standard inspection for defects and balance, but are mounted on a special precision wheel where electronic inspections are made of radial runout and lateral wobble. Another automatic machine measures thickness variation throughout the circumference. This machine screens out tires which exceed the close tolerances allowed, also serving to indicate the accuracy of all prior operations.

For special studies of precision control, tires are mounted on a machine which, by means of strain gauges, makes oscillograph curves of radial, lateral and tangential force variations created by a tire maintained at a constant loaded deflection. Fourier analysis of the harmonic content of these curves is run by electronic computers. Such data may be used to explain the relationship between car vibrations and tire irregularity characteristics. A close examination of the curves usually indicates the source of the offending irregularity and the best method for correction.

Tires made by this precision process have an appreciably higher degree of uniformity than was previously possible. However, the ultimate has not yet been reached. Further developments are in progress, even though such progress becomes increasingly difficult and expensive. The improvements made thus far have reduced periodic disturbances to a level below the background created by the car and road. Tires built to these precision techniques have received enthusiastic acceptance by automobile engineers.

The News Background

At a recent Detroit news conference, A. J. Gracia, manager of research and development, announced Goodyear's plans for a new tire production control system involving an expenditure of $6 million. Nuclear and electronic devices, such as those described in the preceding article, are being installed at the company's plants in Akron, Los Angeles, Gadsden, Ala., Jackson, Mich., and Topeka, Kans.

It is these devices, coupled with knowledge from test track operations and advancements in rubber chemistry, that have enabled Goodyear engineers to reach an "optimum point in tire design which we call 'balanced construction,' " Mr. Gracia explained. He described "balanced construction" as the combination of qualities most desired in passenger tires—long tread life, soft, quiet ride and superior traction.

According to Mr. Gracia, Goodyear has tried to achieve the best possible combination of desirable tire characteristics through precision building, new rubber and improved textiles. The company's passenger tires for 1960 models and the replacement market are from 20 to 25 per cent more durable than those built last year, he added, or about 50 per cent better than tires produced five years ago.

Some of the instruments required for the new methods had to be devised by Goodyear's engineers, since there was nothing available on the market.

EDITORIAL

The Still Small Voice

► The rubber industry, as almost every other industry, heads into the new decade (the "Soaring Sixties") with high hopes—as rightly it should. Most pundits agree that domestic consumption of new rubber in 1960 will approach a 1.65 million long ton mark—and we agree. Economists and industry executives believe that passenger car tire replacement sales will total 68 million units in 1960—and we find no fault with these estimates. It is expected that total rubber industry sales in 1960 will approach a $6.75 billion mark—and we seem to be heading in this direction.

It is with no apology, however, that we point to some rather disturbing facts—facts which have bearing upon our economy as a whole and, of course, upon the rubber industry. In our annual "Review and Preview", which appears elsewhere in this issue, we point out that consumer debt in the United States went up at record rates all during 1959. The enormity of this consumer debt, piled upon record-breaking mortgage indebtedness and unparalleled federal, state and local government debts, is giving many businessmen pause.

The "tight money" policy being pursued by the Federal Reserve Board and the inevitable high interest rates it brings with it, is another cause for reflection, for it may limit capital expansion. It has been predicted in some quarters that unless there is an appreciable relaxation in tight money and high interest policies, there could well be an economic downturn by mid-1960.

The $233 million which the rubber industry says it will invest in capital expenditures in 1960 is heartening news. We hope that in January, 1961, we may look back and see that the estimated figure has been exceeded.

We must recognize, however, that the economy is a delicate instrument. Any change in consumer sentiment will materially affect the economy. The point is this: While we expect 1960 and the years ahead to be good years, there is no reason to expect that good times happen all by themselves. Good times are a result of consumer psychology, governmental attitude and business approach. In balance, most everything seems to point to "Soaring Sixties" but there are many areas which could prove troublesome. We would alert our readers to these potential trouble spots. Predictions of good times bring with them an obligation to make sure that the predictions become fact.

SPECIAL INDUSTRY REPORT

Depreciation's Function in . . .

Helping the Rubber Manufacturer Stretch His Tax Dollar

WHEN you purchase a piece of rubber manufacturing equipment that you intend to use in your business for more than a year, you cannot write off its cost as an expense in the year of purchase. However, you can deduct a portion of its cost as depreciation over the years of the equipment's useful life to the business.

Now, how long will the piece of equipment be useful in the business? This is a decision you must make in the year you purchase depreciable equipment. To aid you in making this decision, the Treasury Department has prepared a guide, "Bulletin F" (available from the U. S. Government Printing Office), which lists the estimated useful lives of many types of equipment that may be used in a trade or business.

However, "Bulletin F" is merely a guide. The life span it lists for a particular piece of equipment could be called the economic or usual life span. If the conditions in your company are such that a new machine will receive more or less than usual use, then you should consider this in arriving at your own estimate of the period the machine can reasonably be expected to be useful to you.

Another decision you must make in the year of acquisition is how much you can expect to get for the machine at the end of its useful life, that is, what its salvage value will be. Here there are no government guides to help you. Fortunately, the only requirement is that your estimate be "reasonable."

Calculating Depreciation

Having estimated the useful life and salvage value of your equipment, you can easily determine the total amount you will be allowed to deduct for depreciation over the years. For example, if a new mixing machine costs you $6,000, has an estimated useful life to you of ten years, and a salvage value of $500, your total depreciation deduction for the machine will be $5,500, never more. The Internal Revenue Service takes the view that you may not claim depreciation deductions below a reasonable estimate of the equipment's salvage value.

Now comes the question of how to claim your deductions. Depending on the method of depreciation you choose to use, your deduction for the first year may vary as much as $1,610—from $550 to $2,160. Here are three approved methods for handling your depreciation.

Using the straight-line method, you subtract the estimated salvage value from the cost or other basis of the equipment and spread the balance in equal yearly amounts over the equipment's useful life.

Alternative Methods Save Now

The declining-balance method can only be used on new equipment with a useful life of three years or more. Salvage value does not have to be subtracted from the cost for figuring the depreciation, but you must not set the amount below a reasonable estimate for salvage. The depreciation is computed by applying a fixed percentage each year to the balance of unrecovered cost. This rate may not be more than twice the yearly percentage that would be used in the straight-line method. Thus, in the case of an asset with an estimated useful life of 5 years the rate would be 40 per cent, for a 10-year life 20 per cent, and so on.

The sum of the years-digits method also can be used only for new equipment with a useful life of three years or more. The depreciation is computed by applying a fraction to the cost less the estimated salvage value. The numerator of the fraction is the number of years of useful life remaining, and the denominator is the sum of the years-digits corresponding to the estimated useful life. If the useful life were ten years, the denominator would be 55 (10+9+8+7+6+5+4+3+2+1). In the first year, depreciation would be 10/55ths of cost less salvage value; for the second year 9/55ths, and so on.

Dollars and cents provide a good measure for comparing the effects of each of these methods. Let us return to the example of the $6,000 mixing machine. It has a useful life to the business of ten years, and an estimated salvage value of $500. The total amount to be depreciated then is $5,500. What could you deduct each year using one or another of these methods?

Year	Straight Line	Declining Balance	Sum of the Years-Digits
1	$550	$1,200	$1,000
2	550	960	900
3	550	768	800
4	550	614	700
5	550	492	600
6	550	393	500
7	550	315	400
8	550	252	300
9	550	201	200
10	550	161	100
Total	$5,500	$5,356	$5,500

Savings through proper tax deductions—

Any tax deduction is a thing to cherish at filing time for it has the effect of reducing your taxable income, but there are a few deductible items that have the rather special characteristic of flexibility. One of these is the deduction you are allowed for depreciation.

For example, let us say that the total amount you are allowed for depreciation of a particular mixing machine is $5,500, which is to be deducted over the ten-year period you have estimated as the useful life of the mixer. Your deduction in the first year may be as low as $550, or it may be as high as $2,160. The amount you decided to deduct will certainly have an effect on your taxable profits for the year.

The amount you deduct for depreciation in a particular year will vary according to the method you choose to depreciate your equipment. The editors of RUBBER AGE present several approved depreciation methods and the tax effect of each, as reported by the American Institute of Certified Public Accountants.

Note that with the declining-balance, the full amount of available depreciation was not deducted during the useful life of ten years. This sometimes happens with the declining-balance method. However, the unrecovered balance is not lost as a deduction. It will be available when the property is sold, retired or abandoned.

First-Year Allowance

If you wish, you can increase your deduction in the first year, regardless of the method you use, by taking advantage of an additional first-year depreciation allowance of 20 per cent. This allowance was created as a part of the 1958 Technical Amendments Act specifically to help the smaller business overcome the drain on capital of equipment purchasing. It is available only in the first year for which depreciation on the equipment may be claimed as a deduction. Here is the way this allowance works:

You can take the additional first-year depreciation allowance of 20 per cent on equipment costing a total of not more than $10,000 ($20,000 on a joint return). The equipment must have a useful life of six years or more. The allowance would be subtracted from the cost of the equipment without consideration of salvage value. The remaining balance would be the basis for computing your regular method of depreciation. In other words, on our $6,000 mixing machine, the 20 per cent allowance would be $1,200, leaving $4,800 to which you can apply any of the approved methods of depreciation subject to the rules for the treatment of salvage value.

Thus, if straight-line depreciation were used, the total depreciation deduction for the first year would be $1,630; declining-balance depreciation $2,160; sum of the years-digits depreciation $1,982.

Making the Right Choice

As you can see, using one method rather than another can certainly affect your taxable income for the year. The question is, would it be better to have larger deductions this year and in the next couple of years which would taper off sharply later, or would it be better to even out your deductions over the entire period? There is no pat answer. You can only make the right decision in the light of your present operations and your budgetary forecast.

One consideration is that a large deduction in the first year will save taxes immediately (rather than later) and provide additional funds for self-financing. Then again, a company with low current earnings but good future prospects might prefer to save some of the deduction for later years by using the straight-line method. These are two possible considerations, but there are others. A certified public accountant could guide you to the right decision for your business.

This article presents merely the essentials of depreciation. There are a number of other questions you may need answered. For example, what happens if you sell the equipment before or even at the end of its useful life and make a gain or loss on the sale? What happens if you trade-in old equipment on new equipment? Does it make any difference whether depreciable equipment is purchased at the beginning of the year, middle or end of the year? Can you change your method of depreciating? Your CPA can help supply answers to these and other questions about depreciation and your taxes.

How To Maintain Grinding Wheel Safety

National Safety Council Offers 14 Basic Rules for Preventing Shop Accidents in Rubber Manufacturing

► THE IMPROPER use of grinding wheels in rubber manufacturing can result in serious injury. That is one reason why strict adherence to safety rules for such operations is stressed in the National Safety Council's "Manual for Industrial Operations."

One basic rule, frequently violated in the shop, should be watched more closely: Never permit any washers or spacers to be used against a grinding wheel when mounting it. Only the proper recessed flanges are permissible.

Flanges should be inspected frequently to check that bearing surfaces rest evenly against the grinding wheel. Straight flanges for a straight-sided wheel should be recessed at least 1/16 inch. If common washers are used, there is danger of uneven pressure being exerted against the wheel during mounting. Room must also be provided for a full nut on the spindle.

Here is a list of safety rules pertaining to grinding wheels:

- Always hold the work with a firm grip.

- Always wear eye protection when grinding. Though the wheel is equipped with an eye shield, goggles are necessary if the hazard of flying particles still exists.

- Check the work rest. Is it adjusted properly (within ⅛ inch of wheel) and securely clamped?

- Are correct working speeds being observed? Never operate above speed recommended by the manufacturer.

- Grinding on the flat side of straight wheels is often hazardous and should not be allowed. Flanges should be correct and of equal diameter, so that pressure is applied to both sides of the wheel evenly. Flanges should be properly machined to give even pressure on a grinding wheel around the entire contact surface as determined by a straight edge. Do not use ordinary washers. Inspect flanges at frequent intervals.

- Never remove wheel washers (blotters). They are meant to cushion and compensate for unevenness of the wheel or of flanges against the wheel.

- Do not grind too high above the center line of the wheel.

- Inspect grinding wheels for damage received in shipment and then give the wheel the ring test. This test is made by suspending the wheel free and clear on a string and tapping it gently with very light implement. A sound wheel gives a clear metallic tone.

- Always store abrasive wheels in racks under strict control. Bins or drawers are all right for small wheels if in boxes.

- Never force a wheel on a spindle.

- If rebushing is necessary to make the wheel fit a spindle, it should be done by a machine shop with proper equipment.

- Never exert too much pressure on end nuts. You may spring or distort a flange or even break the wheel.

- Always run a new wheel at least a minute at full operating speed before applying work. During this run, the operator should stand to one side.

- A protective hood consists of a band around the face of a wheel with side pieces on each side. If the wheel breaks the band, these side pieces will retain broken parts. Care should be taken to see that such a hood is properly replaced after mounting wheels.

NEWS REPORTS
and industry activities

JANUARY, 1960

Refinancing Program Planned To Reopen Sun Rubber Company

► McNeil Machine & Engineering Co., Akron, Ohio, and McDonald & Co., Cleveland, Ohio, investment bankers, have announced that they will provide $2,750,000 in new capital for the reopening of the Sun Rubber Co., Barberton, Ohio. According to the announcement, the refinancing program will enable Sun Rubber to pay off creditors in full and leave adequate working capital for operations. Details of the fund-raising program have not been released, but it has been reported that plans call for the sale of securities by McDonald & Co. with McNeil as the probable majority purchaser. A registration statement covering the sale of securities is expected to be filed early in 1960 with the Securities and Exchange Commission. T. W. Smith, Jr., who has headed Sun Rubber for a number of years, will continue to serve as president. Charles F. Safreed, president of McNeil will be chairman of the board of directors.

Sun Rubber ceased operation in the Spring of 1958, and subsequently filed a petition under the Bankruptcy Act seeking a moratorium on its debts. The bankruptcy hearing has been pending in the courts since its filing. A major factor in the planned restarting of Sun Rubber's operation was its recent victory in a five-year old patent suit, upholding two key patents. One patent covers a process for casting articles from polyvinyl resins, such as dolls and toys. The other patent covers a machine for casting the articles. It is claimed that these patents have important applications, not only in making toys and dolls, but in many other commercial and industrial products. Sun Rubber's patent suit was against Akron Presform Mold Co., Cuyahoga Falls, Ohio, and National Latex Products Co., Ashland, Ohio.

Stauffer Acquires General Foam

► Stauffer Chemical Co., New York, N. Y., has announced that it has acquired General Foam Products Co., Los Angeles, Calif. According to Stauffer, General Foam produces expanded polystyrene under the brand name of Crest-Foam. The newly-acquired firm will be operated as a unit of Stauffer's Molded Products Division, the company states.

RUBBER AGE To Adopt Slot Binding Process

► Beginning with the April, 1960, issue, RUBBER AGE will adopt a new adhesive binding process. Now bound by the side-stitched method involving the use of wire stitches, the new method will allow for several plus factors: (1) The magazine will lie flat when opened, allowing for more attractive editorial spreads; (2) Individual pages may be removed from the magazine even more easily than when pages have been perforated. The new method of binding RUBBER AGE has been made possible by the development of a new adhesive binding process known as "slot binding". We believe that our adoption of this new method will ultimately provide a better editorial product with greater flexibility and attractiveness. The decision to utilize the new binding process is but another step in our efforts to provide a publication with not only the best editorial content, but with the most attractive and useful mechanical format.

The Publishers

Butadiene Plant for Sale

► General Services Administration, Washington, D. C., reports that the U. S. Government is putting up for sale its butadiene plant at Louisville, Ky. According to GSA, the sale will be made when sealed bids are opened on February 9. The government's cumulative inventory value of the plant is $30 million, GSA states. The plant, originally designed and built to make butadiene from ethyl alcohol and operated by Union Carbide Corp., during World War II, was put up for sale in 1953, but had no buyers. GSA reports that the rated capacity of each of the plant's three units is 120,000 tons of butadiene a year, and the demonstrated capacity is about 87,000 tons a year. The plant is located on 139 acres fronting on the Ohio River, and consists of 36 buildings, 24 being of brick, steel and concrete construction, according to the GSA report.

Richardson Acquires Interest In Plastics Corporation

► Richardson Co., Melrose Park, Ill., reports that it has acquired for cash a majority interest in Plastics Corp. of America, Stamford, Conn. According to the company, the acquisition will provide diversification into the plastic materials field, and will give it a manufacturing and marketing outlet for new products expected from its recently expanded Research and Development Division. Richardson is a producer of industrial rubber and plastics products, including automotive battery parts and a variety of other molded products, Insurok laminated sheets, rods, tubes and fabricated parts. Plastics Corp. is a relatively new polystyrene producer, supplying thermoplastic materials for the plastics fabricating industry. Until the acquisition, Plastics Corp. had been a subsidiary of Lincoln Plastics Corp.

The company has announced that Carl J. Luster, president of Plastics Corp., will remain as a member of its board of directors, as will Harry A. Hachmeister, president of Hachmeister, Inc. Mr. Luster will also continue to serve as president. New members of the board of directors are William B. Basile, president of Richardson, who will be chairman, and the following vice-presidents of the Richardson Co.: Walter S. Becker, James R. Dudley, John B. Hermes, Harold C. Steadman and Alan F. Thompson. Richard G. Brown will continue as vice-president of Plastics Corp. Mr. Hermes was elected treasurer and secretary of the company.

Appointed General Aniline Distributor

► Chemicals & Pigments Corp., 227 California St., Newton 58, Mass., has been appointed to handle the New England distribution of the organic pigments and the oil- and spirit soluble dyes manufactured by the Dyestuff and Chemical Division, General Aniline and Film Corp.

These pigments and dyes are used primarily by the paint, plastics and rubber industries. It is thought that the appointment of the Massachusetts firm will add sales effectiveness for these products in the Northeast and also that it will provide increased customer service.

Vila Discusses 1960 Outlook for In-Process Materials

► In a paper entitled "1960 Outlook for In-Process Materials," George R. Vila, group executive vice-president of the U. S. Rubber Co., New York, N. Y., predicted booming sales of industrial raw materials in 1960. Speaking before the American Management Association's annual sales forecasting conference, he said that present signs indicate that 1960 will be another boom year for in-process materials. Gains are anticipated in rubber, chemicals, plastics and metals, with studies showing that textiles should remain at the level reached in 1959, a textile boom year.

The over-all picture of gains in the in-process materials field is shown in the table below, in which estimated consumption figures for all in-process materials are given a value of 100. From this base, actual usage for the last two years and predicted consumption for 1960 are computed on a percentage basis.

Summary(1)

	1957	1958	1959	1960
Rubber	**92**	**86**	**100**	**108**
Textiles	86	85	100	100
Chemicals	92	91	100	106
Plastics	80	85	100	111
Metals	99	86	100	109
Total(2) FRB Index of Ind. Prod.	93	87	100	107
	95	89	100	105

(1) 1959 = 100
(2) Weighted Average

Using charts and tables to illustrate his talk, Mr. Vila closely analyzed rubber; textiles; chemicals and allied products; plastics; and metals, including steel, aluminum, copper, lead and zinc. Speaking of the rubber industry, he stated that in this field, a well-defined boom crested in 1955, and then production flagged as the recession set in. Bottom was reached in July, 1958, and a recovery cycle started which carried the industry to maximum capacity operations in the first quarter of 1959. Strikes in a number of major rubber plants then caused a severe readjustment, and the industry, he said, is only now nearing capacity levels again as it rebounds from this setback.

Expects Capacity Operations

Mr. Vila expects capacity, or near effective capacity operations in 1960. The major demand factor should be a new high in replacement tire sales, the rubber industry's largest volume item. Original equipment tires, the industry's second largest item, are also forecast at substantial gains over the past few years. Mechanical rubber goods, such as belting, hose and molded products made for industrial customers, are expected to develop strong recovery tendencies during 1960. Footwear, flooring, drug sundries, sporting goods and other consumer products are expected to continue at high levels. In short, he said, the outlook for the rubber industry is dynamic and a record high in consumption is likely to be achieved early in 1960.

Materials Choice Restricted

Continuing with his analysis, Mr. Vila stated that the choice of materials available to the rubber processor will be restricted by conditions peculiar to the industry. The amount of natural rubber available in the United States is expected to be held to about 550,000 long tons annually, with the recent decision of the United States government to gradually liquidate its natural rubber stock expected to have little effect on the situation. General purpose synthetic rubber, styrene rubber, is expected to encounter the highest demands in terms of absolute tons in its peace-time history.

Demand is also expected to increase for the specialty synthetic rubbers. The newest synthetic rubbers, such as polyisoprene and polybutadiene, are expected to be moved into the initial phases of commercial production and should find a ready market in the truck-bus tires field. Mr. Vila estimated that rubber industry sales in 1959 will reach $6.25 billion, a 16 per cent increase over the $5.40 billion of 1958 and a 9 per cent increase over the previous high of 1957. In 1960, he expects $6.75 billion in sales, or 8 per cent over 1959. After discussing other in-process materials, Mr. Vila concluded his talk, stating that a sales increase or a high level of sales is expected for each of the industries discussed.

J. H. Morrison

H. J. Bennett

B. F. Watkins

Goodyear Adds Three to Sales Staff

► Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio, has announced the addition of three new men to its field sales staff. J. H. Morrison has been appointed sales representative for the division's West Coast district. H. J. Bennett has been named sales engineer in the Rubber and Rubber Chemicals Department, and B. F. Watkins has been assigned as field sales trainee. Mr. Morrison graduated from the University of California at Los Angeles with a B.S. degree in chemistry. A former compounder at Goodyear's Los Angeles plant, Mr. Morrison joins the Chemical Division from the post of chief chemist with another rubber firm. He is a member of the Los Angeles Rubber Group.

Mr. Bennett graduated from the University of Akron with a B.S. degree in chemistry. He joins Goodyear with five years of experience in rubber compounding. He is a member of the Akron Rubber Group and the American Chemical Society. Mr. Watkins graduated from Texas A&M University with a B.S. degree in Chemistry. He joins the Chemical Division from Goodyear's training squadron.

Albert Loses Patent Suit

► Common Pleas Judge John Kelly has adopted findings of a referee in a patent suit involving the now defunct firm of Albert-Harris, Inc. The decision was unfavorable to Akron financier, Sidney Albert. Mr. Albert claimed ownership of about 82 machinery patents as did his former partner Edward J. Harris, and German inventor, Adolph Frolich. The Albert claim was based on his having furnished the firm with $1,000,000 and more during the early 1950's. Former judge, Walter B. Wanamaker, sitting as a Court appointed master commissioner, found that 75 of the patents belong, by contract, to Mr. Harris and Mr. Frolich, while the other seven were given by contract to the firm. Mr. Albert got nothing by the decision which was upheld by Judge Kelly.

United Carbon Realigns Marketing Department

Organization chart indicates United Carbon's new Marketing Department

► Morrison M. Bump, executive vice-president of the United Carbon Co., Inc., has announced a major realignment and expansion of the company's domestic and international marketing operations. Mr. Bump also announced the establishment of a Marketing Committee.

"Our expansion and relocation of marketing functions is aimed at speeding up product development, improving delivery schedules, intensifying laboratory and in-field technical service. In general, it means more and broader personal service to our customers and faster reactions to the industries we serve," he stated.

"The new Marketing Committee has offices in New York, Houston, Texas, and Akron, Ohio. By means of monthly committee meetings, our group will keep on top of the fast-changing needs of the carbon black and black masterbatch industries. Special progress reports will be immediately forwarded to all local sales personnel. The prime purpose of the committee is to support the sales representatives in constantly improving service," he declared. The following persons have been appointed to the Marketing Committee:

John F. Bahm, manager of international sales; James A. Boyle, manager of carbon black and rubber sales; Harry Bowen, manager of distribution; Frank O. Holmes, Jr., manager of laboratory technical service; Russ Matthews, manager of advertising and public relations; James A. Myers, manager of national account sales; Carl W. Snow, manager of field technical service.

Mr. Bump also appointed in a Marketing Committee advisory capacity, Ely Balgley, manager of market research, and Dr. Isaac Drogin, senior technical advisor.

John Bahm, new international sales manager, has spent a major portion of his life abroad. He attended primary school in Europe and South America, and speaks, reads and writes Spanish, French, Italian and Portuguese. He was graduated from L.S.U. with a regree in chemistry. He was fomerly manager of new products and commercial development with United.

James Boyle, previously sales coordinator, now heads up carbon black and rubber sales. Prior to joining the company, he spent eight years with Armstrong Rubber. Under the new marketing structure, all district sales managers report to Mr. Boyle.

Harry Bowen, now manager of distribution, was formerly materials control manager for the United Rubber & Chemical Corp., the rubber manufacturing division of United Carbon Co., Inc. In his new assignment, Mr. Bowen will be located in Houston and will direct domestic and international order processing, traffic and shipping.

Frank Holmes, the new manager of laboratory technical service, will be in charge of the new technical laboratory. The new laboratory will be completed in early 1960 and is located in Akron, Ohio. Before joining United Carbon, Mr. Holmes was associated with Voit Rubber and Armstrong Rubber.

Russ Matthews, new advertising and public relations manager, has spent 28 years in advertising and marketing with the Union Carbide Plastics Co. His last assignment at Carbide was as manager of marketing for the Vinyl-foam Division.

James A. Myers, new manager of national account sales, will coordinate sales and service to multiple plant customers. He ran the company's Akron office for the past four years and has been associated with United Carbon in a sales capacity for the past 14 years. His brother, Fred Myers, now heads up Akron district sales.

Carl W. Snow, manager of field technical service, was previously manager of sales service. He has had over 25 years of carbon black research, development and production experience. His newest assignment is to develop a national network of field technical service personnel for customer assistance. Mr. Snow is a chemical engineer.

Ely Balgley, new manager of market research, was formerly associated with Wyandotte Chemicals as asssistant director of marketing research. He has also worked in product and market development assignments for General Electric, Heyden-Newport and General Foods.

Dr. Isaac Drogin, senior technical advisor, will report directly to Mr. Bump. Dr. Drogin has been associated with the carbon black industry for more than 38 years. He joined the company in 1939 as director of research. In 1955, he was appointed vice-president of United Carbon Co., Inc., and in 1957 was named a vice-president of United Rubber & Chemicals Co. One of the acknowledged scientists of the carbon black industry and rubber technology, his writings have appeared in most of the major U.S. and foreign technical publications.

Discuss Advances in Rubber at ACS Southwest Regional Meeting

► Three papers of interest to the rubber industry were presented before the Southwest Regional meeting of the American Chemical Society, held at Baton Rouge, La., recently. "New Monomers—A General Survey of Recent Developments," by Dr. J. D. D'Ianni (Goodyear), predicted development of new synthetic rubbers and plastics with exceptional resistance to heat, light and radiation. New techniques of polymerization are expected to permit the creation of a duplicate of natural rubber and stereoregular polymers which were previously impossible to synthesize.

Dr. D'Ianni went on to say that work which has begun on polymers having exceptional resistance to heat, light and radiation and other deleterious environmental factors will assume more importance in the space age. He believes that the great variety of raw materials and techniques for polymerizing them, will permit the achievement of a nearly continuous spectrum of products ranging from nervy, lively rubbers to hard, brilliant, crystalline plastics.

More Colorful Rubber Products

Dr. Marvin C. Brooks (U. S. Rubber Co. Research Center), speaking at a symposium on polymer chemistry, stated that more colorful rubber products will be possible with newly discovered ways to change the ingredients that go into processed rubber. He described new compounding agents which can be used to improve properties of colored rubber products. In the past, he said, rubber scientists have not been able to achieve colored compounds as strong and tough as black compounds. He described how tough colored compounds can be produced by modifying clay and silicas to bond chemically in the same manner that carbon black bonds with rubber. Certain organosilanes react with the clay and hydrated silicas to improve their reinforcing properties in rubber compounds, Dr. Brooks and his associates discovered. As an outgrowth of this discovery, he said, non-toxic silane chemicals have been developed which can be added directly to these compounds to achieve the reinforcement improvements.

New Type Synthetic

J. R. Haws (Phillips Petroleum), whose report also was presented at the symposium on polymer chemistry, discussed the development of a new type of synthetic rubber which is said to be able to double as a plastic. The material, called high-*trans*-polybutadiene, has rubber properties that recommend its use in shoe soles, floor tiles, and coverings for cables and golf balls. Because it can be milled, extruded, melted and molded, the new material can also be considered a plastic, he said.

The synthetic rubber is not as stretchy as natural rubber, but matches it for hardness and resilience. It can be vulcanized normally with sulfur and peroxides and depending on how it is processed, the vulcanized product may vary from a hard inelastic material to one that is soft and rubberlike, he added. According to the speaker, "This type of polymer is unique in several ways and displays properties resembling those of both rubbers and plastics. For this reason, *trans*-polybutadiene is expected to be of considerable interest from the practical use standpoint."

Bruce W. Barnes

L. F. McBride

Columbian Carbon Names Two

► Columbian Carbon Co., New York, N.Y., has announced that Bruce W. Barnes and L. F. McBride have joined its Carbon Black and Pigment Division as sales representatives. Mr. Barnes, a graduate of Bucknell University, joins Columbian Carbon from Berkshire Chemicals, Inc., where he was a branch sales manager. In his new assignment, Mr. Barnes will be located in the firm's Camden, N. J., office and will serve the Middle Atlantic states. Mr. McBride is a graduate of Dartmouth College. Prior to his present appointment, he was general purchasing agent with Landers Corp.

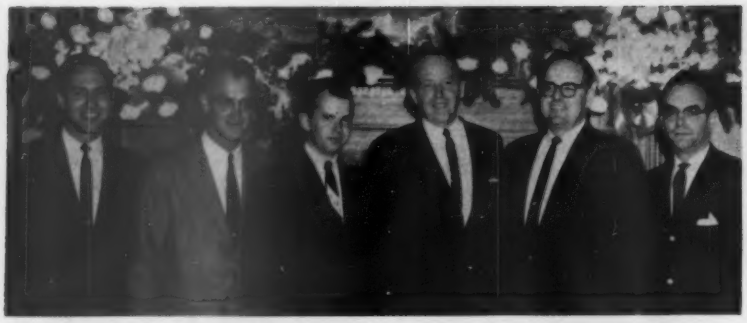
U.S. Army Engineers Develop Tank

► The Department of Defense, Washington, D. C., has announced that the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., has developed a 90,000-gallon collapsible tank, believed to be the largest of its kind. It will be used for the storage of military fuels. The tank, built by Goodyear Tire & Rubber Co., Akron, Ohio, is fabricated of two-ply nylon cloth with synthetic rubber. It weighs approximately 2,700 pounds empty, is 64 feet long and 24 feet wide.

New Eastman Polyethylene Resins

► Development of three entirely new low molecular weight polyethylene resins designed to fit a growing list of prospective uses in rubber, coatings, polishes, textile finishes and in plastic molding and extrusion compounds has been announced by Eastman Chemical Products, Inc., New York, N. Y., subsidiary of Eastman Kodak Co. The new resins, designated Epolene LVE (low viscosity, emulsifiable); HDE (high density, emulsifiable), and HD (high density), are designed to round out Eastman's already existing line of Epolene compounds, consisting of types E, C, N and LV.

The expanded family of seven Epolene resins now offers low molecular weight polyethylene users a wide range of molecular weights (1500-7000), densities (0.902 to 0.956) and viscosities, the company claims. Eastman production facilities have been expanded at Longview, Texas, to permit early availability of the new compounds on an industrial scale, and to meet increasing demands for the four original Epolene compounds. At the same time, production of Epolene E and N compounds previously accomplished at Kingsport, Tenn., has been moved to Longview where all seven types will be manufactured.



The 1960 officers and directors of the Northern California Rubber Group. Left to right: *Secretary*, Donald M. Preiss (Shell Development); *Directors*, Stanley Mason (H. K. Porter) and Raymond Brown (Burke Rubber); *President*, Bernie Fuller (DuPont); *Vice-President*, Keith Large (Oliver Tire); and *Treasurer*, Vic Carriere (Oliver Tire). Not shown is Director Norman Burke (Burke Rubber).

NCRG Installs Officers at Xmas Party

► The Northern California Rubber Group installed new officers and directors at its Annual Christmas Party on December 5 at the Orinda Country Club, Orinda, Calif. The 1960 officers and directors are: *President*, Bernie Fuller (DuPont); *Vice-President*, Keith Large (Oliver Tire & Rubber); *Secretary*, Don Preiss (Shell Development); *Treasurer*, Vic Carriere (Mansfield Tire & Rubber); and *Directors*, Ray Brown (Burke Rubber), Norman Burke (Burke Rubber), and Stan Mason (H. K. Porter).

Carl Mayerhauser (N. J. Zinc) served as chairman of the Christmas Party, assisted by Gene Unterzuber (Oliver Tire), Keith Large (Oliver Tire), and Vic Carriere (Mansfield Tire). Seventy-five couples attended the party, which included dinner and dancing. Camelia corsages were presented to the ladies. Twenty-five door prizes were awarded with two main prizes, a 17-inch portable television set and a Waring Blender, won by Mrs. R. C. Claussen (H. K. Porter) and Mrs. J. W. MacKay (Monsanto), respectively.

Dismiss Suit Against Seiberling

► A Common Pleas Court jury in Akron, Ohio, has returned a defendant's verdict in a $20,650 damage suit contending tire manufacturers are liable for injuries to motorists hurt when tires blow out. The test suit was brought by Joseph Weissfield, food and and beverage concessionaire at the Brookside Park Zoo in Cleveland, Ohio, against the Seibering Rubber Co., Akron, Ohio. Mr. Weissfield asked for damages, claiming that the tire had not lived up to what a dealer promised for it. Judge Frank H. Harvey dismissed the claim.

The manufacturer does not promise to pay damages if a blowout injures a rider, the judge said; he promises an allowance toward purchase of another tire if the purchase goes bad. The case was permitted to go to the jury on Mr. Weissfield's further claim that the defendant was negligent in permitting construction of a defective tire. The company asserted abuse, not defects, caused the blowout. The test suit was watched carefully by the rubber industry. Attorneys said manufacturers would have been rewriting their guarantee clauses had the verdict gone the other way.

Naugatuck-Rumianca on Stream

► Naugatuck-Rumianca, S. p. A., a recently formed company jointly owned by the U. S. Rubber Co. and the Rumianca Co., one of Italy's largest chemicals firms, has begun operation of a newly built plant in Borgaro Torinese, a suberb of Turin. It is currently producing tonnage lots of B-L-E, a chemical developed by U. S. Rubber's Naugatuck Chemical Division to increase the service life of rubber products by combatting the aging effects of heat and oxygen. Scheduled for early production is Polygard, a non-staining stabilizer. This is another Naugatuck Chemical product.

Polygard, specifically developed for the synthetic rubber industry, maintains the physical properties of synthetic rubbers during production and processing. These two initial products will be followed by a complete line of antioxidants, accelerators and specialty chemicals for Europe's rubber industry. A technical team from the American rubber company helped to design and start-up the new chemical plant. The plant's Italian technical staff was also trained at the main plant of U. S. Rubber's chemical division in Naugatuck, according to the company.

Ontario Group Hears Gnaedinger At Christmas Party Meeting

► The Ontario Rubber Group held its Christmas Party Meeting on December 10, at the Fisher Hotel in Hamilton, Ontario, Canada, with 140 members in attendance. During the technical meeting, Paul E. Gnaedinger (Dominion Rubber) presented a talk entitled, "Basis for Inventory Control." The Christmas Party featured a cocktail hour, dinner, and prizes for lucky ticket holders.

Mr. Gnaedinger approached his subject from statistical analysis of market research, warehouse inventory, and production planning. He plotted actual sales, showing seasonal trends and method of interpreting variation. He proposed two methods of production, either by straight line production on a steady monthly basis, or by varying production using one or two shifts to meet the seasonal demand. On the straight line production, Mr. Gnaedinger showed how production should be tapered by quarterly intervals on actual sales demand against forecast, and how the original straight line chart would vary its end point as the year progressed.

The Ontario Rubber Group held a technical meeting on November 17 at the Kress Hotel in Preston, Ontario. J. O. Harris (Monsanto) presented a paper on "Chemical Inhibition of Ozone Degradation of SBR Rubber." Mr. Harris' talk was a repeat of the paper he presented at the Rubber Division, ACS, meeting last Fall in Los Angeles, Calif.

On October 20, 123 members attended the group's technical meeting at the Pickfair Restaurant in Toronto, Ontario. Zolton Dorko (Polymer Corp.) presented a talk on "The Production and Properties of Fast Curing Butyl Rubber."

D-11 Plans Technical Meeting

► Committee D-11 on Rubber and Rubber-Like Materials will be among the thirty technical committees to meet during the Committee Week meeting of the American Society for Testing Materials, to be held at the Hotel Sherman in Chicago, Ill., on February 1 to 5, 1960. Approximately 350 meetings of subcommittees and working groups will convene to advance toward completion of the year's committee work in anticipation of preparing reports for presentation to the Society at the annual meeting in Atlantic City in June. Several other features have been planned, including a panel discussion on "Measurement of Color and Gloss of Anodized High Silicon Architectural Aluminum Alloys" on Thursday, February 4; a discussion on time-lapse photography by John Nash Ott on Wednesday, February 3; a Committee Week dinner and a social hour.

Eighth Annual Wire Symposium Attracts Attendance of 1,047

► The Eighth Annual Symposium on "Technical Progress in Communication Wires and Cables," jointly sponsored by industry and the U. S. Army Signal Research and Development Laboratory, was held on December 1, 2, and 3 at the Berkley-Carteret Hotel in Asbury Park, N. J. A record number of 1,047 persons registered for the three-day symposium which featured the presentation of 25 papers at 5 technical sessions.

A banquet, attended by 450 persons, was held on Wednesday evening, December 2, with J. L. Robb (Superior Wire & Cable) serving as toastmaster. During the banquet, gifts were presented to Howard F. X. Kingsley (Symposium Committee Chairman), Fred W. Wills and Ray Blain, all of the Signal Corps, for their efforts in the organization of the symposium as members of the Symposium Committee. The committee included C. T. Wyman (Bell Labs), I. T. Stoneback (ITT Labs), H. L. Wuerth (Goodrich Chemical), J. E. Robb (Superior Wire & Cable) and Ben Levinson (Okonite).

A number of papers presented at each of the technical sessions were of particular interest to the rubber and rubberlike plastics industries. These papers are abstractel below. The first technical session, held on Tuesday morning, December 1, was chaired by H. L. Wuerth (Goodrich Chemical). The second technical session, held on Tuesday afternoon, was under the chairmanship of J. L. Robb (Superior Wire).

C. T. Wyman (Bell Telephone Laboratories), chaired the third session held on Wednesday morning, December 2. On the afternoon of the same day, I. T. Stonebeck (I.T.T. Laboratories) chaired the fourth session. The final session was held on Thursday morning, December 3, with Ben Levinson (Okonite) as chairman. Papers of interest to the rubber and rubberlike plastics industry appear herewith:

Ditridecyl Phthalate (DTDP) in High Temperature Vinyl Insulation. ***W. A. Dimler, Jr. (Enjay Labs).*** A new phthalate plasticizer based on oxo tridecyl alcohol has extended the range of application of oxo phthalates in vinyl insulation. Ditridecyl phthalate (DTDP) has demonstrated performance characteristics equivalent to other plasticizers when tested in high temperature vinyl insulation.

Scope of I.P.C.E.A. Standards for Polyethylene Insulated Thermoplastic Jacketed Communication Cables. ***J. Vincent McBride (Plastic Wire & Cable).*** While major telephone operating companies were making increasing use of new thermoplastic materials in their cable plants, the smaller independents also needed cables made of readily available materials which had excellent reliability of service. In 1956, the I.P.C.E.A. recognized an obligation to provide standards for thermoplastic insulated and jacketed communication cables because there were no industry standards except one which tended to eliminate construction feature alternatives.

Cable Sheaths and Water Permeability. ***Gordon F. Todd (Collyer Insulated Cable).*** Workers in the cable industry have striven to reduce moisture hazard by improving the moisture resistance of insulations and splicing methods. Work was done to throw light on such questions as: Are rubber and plastic sheaths capable of great water resistance?; What is the effect of temperature and wall thickness upon the water resistance of a protective sheath?; What are the standards of reference?; What is the validity of the test methods?

Considerable data was established bearing upon the performance of a number of different materials in water. The degree to which a cable sheath material can protect the interior of a cable from moisture may be determined by simple water permeability tests. Water permeability tests are more reliable for this purpose than water absorption tests and agree quite well with elaborate cable soaking tests carried out for many months at elevated temperatures.

The Problem of Drying Polyethylene Sheathing Compound Prior to Extrusion. ***F. H. Kruger (Western Electric).*** Early in August, 1957, difficulty was experienced with blisters in carbon black bearing polyethylene cable sheath at the Hawthorne Works of the Western Electric Co. The worst blisters appeared when the extrudate was emitted from the die. At times, blisters appeared continuously along the length of the cable. Added to this, the surface was often rough due to drooling.

This paper covers the investigation of: (1) Moisture content determinations; (2) Factors affecting moisture content including blended carbon black and humidity conditions; (3) Maximum allowable moisture content; and (4) Obtaining the desired moisture content in polyethylene sheathing compound including principles of drying, equipment selection, operation with commercial dryer, and additional development.

Design and Application of Missile Cables Employing Laytex Insulation. ***W. K. Priestley, E. J. D'Aquanno and C. J. Tappero (Kaiser Aluminum & Chemical).*** In its infancy, latex was not normally employed as a primary insulation but as a saturant for both paper and cotton. Continued development work resulted in improvements in the techniques of purification, compounding, and application and permitted the use of latex as a primary insulation in the middle thirties. Since the various branches of the Armed Forces are always looking for small diameter and lightweight cable to do a given job, cables having Laytex insulation were adopted for many applications where these features and dependability were of prime importance. As technology in the weapons systems progressed from the electrically controlled artillery pieces to the original "Nike" systems and on to the present guided missile systems, mechanical and electrical requirements for the supporting ground control cables became more stringent and cable designs became more complex. The versatility of Laytex made the design and construction of these complex cables possible.

The third technical session, with C. T. Wyman (Bell Labs.) serving as chairman, was held on Wednesday morning, December 2. Five papers were presented at this session:

The Systematic Control of Rubber to Metal Adhesion in the Wire and Cable Industry. ***Richard P. Stout (Hughson Chemical).*** Dependable rubber-to-metal adhesion is being obtained by mechanical molded goods and other rubber processors, usually with the use of adhesives. Bonding procedures in other industries may be quite different from those employed in the wire and cable industry, but the same physical, chemical and thermodynamic principles appear in all rubber bonding processes. Understanding of these principles is basic to operation and to control of bonding. There are many elements that must be held

constant in order to insure reproducibility of adhesion. With these elements in hand, control of the level of adhesion lies in the regulation of amount of chemically active adhesive on the clean wire surface, and this is most readily adjusted by means of adhesive selection and dilution.

The Dependence of Photolytic Degradation of Polyethylene on Degree of Dispersion of Carbon Black. ***V. L. Lanza, J. H. Heiss and W. M. Martin (Bell Labs).*** Since resistance to degradation by light is dependent upon the degree of dispersion of the carbon black, it is important to determine this property on compounds specifically produced to render long outdoor service life. To determine the correlation between the optical slope and the resistance to photolytic degradation, samples of polyethylene were prepared in which a single carbon black was dispersed to widely different degrees of aggregation. These specimens were then subjected to an accelerated weathering test and their degradation followed by both low temperature brittleness and dielectric loss.

Ethylene Copolymers for Wire Coating. ***R. F. Craig, T. E. Branscum and P. J. Boeke (Phillips Chemical).*** More than four years ago Phillips Chemical recognized the problem of stress cracking in linear polyethylene. With these linear polyethylene resins, a variation of stress cracking commonly called thermal stress cracking or thermal embrittlement appeared to be the dominant problem. Phillips started a research program to develop a tailor-made resin for the wire and cable industry which would have excellent stress crack resistance yet retain good processibility and the desirable properties of linear polyethylene.

This research culminated in the development of wire and cable grade ethylene copolymer (5000 series) resin. This paper reviews the pertinent physical and electrical properties of the copolymer resin, discusses extrusion equipment and conditions, and presents field installation tests of various copolymer coated wire and cable.

New Insulation Applications of High-Density Polyethylene and Polypropylene. ***W. Paul Acton and Lawence C. Petzold (Hercules Powder).*** The most important properties responsible for the increasing use of high-density polyethylene are its toughness and abrasion resistance. Polypropylene is one of the newest thermoplastic materials which seem to offer great promise to the wire and cable industry. Because it has been available for such a short time, there are still many unanswered questions regarding its use in this field. However, the outstanding properties of polypropylene, its high melting point, crush resistance, and complete lack of stress cracking, seem to assure its place in future application in the wire and cable industry.

Filler Study in Cross-Linked Polyethylene. ***W. F. Abbey, B. C. Carlson and R. T. Zimmerman (R. T. Vanderbilt).*** Some time ago a new engineering composition was introduced and became of immediate interest to the wire and cable industry. This composition is vulcanized or cross-linked polyethylene, filled with medium thermal black and containing an antioxidant. This paper (1) compares physical and electrical properties of medium thermal black filled, cross-linked polyethylene with natural ground calcium carbonate filled, cross-linked polyethylene; and (2) describes the changes in physical and electrical properties of these compositions as the degree of cross-linking is varied, either by altering the quantity of cross-linking agent or by altering the length of cure.

An Evaluation of Heat Stabilized, Flame-Retarded, Cross-Linked Polyolefins for Electronic Wire and Cable Applications. ***P. M. Cook, R. M. Muchmore and H. Rapp (Raychem Corp.).*** Polyolefins, although important insulations for power and telephone wire and cable, have only recently been considered for electronic hook-up wire and cable. Four properties of the polyolefins have limited this application in spite of otherwise almost ideal characteristics. These limitations have been flammability, low softening temperature, poor oxidation resistance at elevated temperatures, and poor load deformation properties.

Thermal Aging Characteristics of Aircraft Wires and Cables. ***E. L. Brancata and F. J. Campbell (U.S. Naval Research Lab).*** A study was undertaken to: (1) Establish a functional evaluation procedure for determining thermal life of electrical wire and cable insulation; (2) Determine the feasibility of evaluating the deterioration of insulation resulting from thermal aging under conditions of cycling temperatures; and (3) Establish a procedure for utilizing these findings in the design of circuit breaker and/or fuse protection for an electrical distribution system. In related fields, the lives of insulating materials and systems for motors and transformers have been evaluated both mathematically and experimentally, and the experience thus gained will be applied herein to aircraft cable insulation.

Experimental Results on Cellular Dielectrics for Telecommunication Cables. ***R. Monelli (Pirelli, Italy).*** The advantages obtainable by the adoption of cellular polyethylene in the insulation of telecommunication cable conductors are well-known, as, for a given set of electrical characteristics, it is possible to obtain cables of smaller dimensions by applying a smaller amount of insulating material. Satisfactory results are obtained in the manufacture of small coaxials for telephone systems with transistor repeaters.

Automatic Conveyor for Polyethylene Granules. ***H. H. Burroughs, G. A. Quick, Jr. and J. F. Sheehan, Jr. (Western Electric).*** When the new Western Electric PIC cable plant at Omaha, Nebraska, was planned, provisions were made to use Sealdbins to handle some 25 million pounds of polyethylene and polyvinylchloride, it was estimated would be used each year. This paper is a description of one portion of the design of an automatic handling system.

Introduces Two Compounds

► Silicones Division of the Union Carbide Corp., New York, N. Y., has placed on sale two new types of low-shrink silicone rubber stock for cable and wire insulation. The first, Union Carbide K-1347 Silicone Rubber Compound, is a premium grade material with superior physical and electrical properties for high quality wire and cable insulation under conditions of exposure to extreme hot and cold temperatures. Designed for use on wire to meet military and industry specifications, it can be continuously vulcanized at the wire factory on conventional equipment with either steam or hot air. It is supplied in sheet form in 25 and 50 pound cartons.

The second is Union Carbide K-1357 Silicone Rubber Compound, which is available in coiled strips for direct feed to the extruder. It can be cured in either steam or hot air in the wire manufacturing process. K-1357 is said to give excellent electrical and physical properties at moderate cost, in addition to affording savings in the fabrication process. Both compounds are white in color and can easily be color-coded to desired shades.

► U. S. Rubber Co. reports that Clifford L. Hilton, a research scientist at its Wayne, N. J. Research Center, discussed colorimetric identification of rubber chemicals, in a paper presented before the Analytical Division of the American Chemical Society at the society's 136th Annual Meeting in Atlantic City, N. J.

► St. Joseph Lead Co. has announced the appointment of R. E. Carroll, Inc., Trenton, N. J., as its sales representative in eastern New York and western Connecticut.

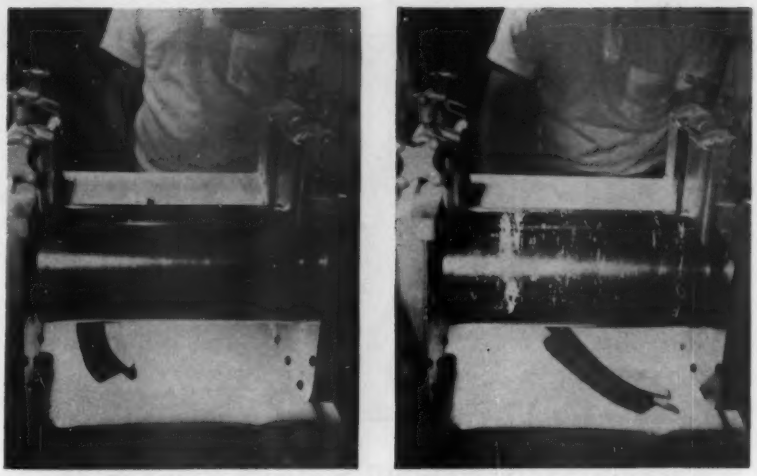
American Cyanamid Develops New MBTS Accelerator

► American Cyanamid Co., New York, N.Y., has announced the development of a new MBTS accelerator which is reported to have an excellent dispersibility to give greater efficiency and economy in manufacturing natural, styrene-butadiene, and nitrile rubber products. According to the company, shorter mixing cycles, lower reject rates, better dispersion and elimination of refining and masterbatching are some of the process savings that can be realized with the company's new MBTS. Its vulcanization activity and accelerating characteristics remain unchanged. American Cyanamid reports that two critical sections of the rubber industry in which the incomplete and non-uniform dispersion of MBTS in rubber has presented serious problems are the electrical wire insulation and the thin-walled, molded product fields. In these areas, poor dispersion of the accelerator often results in holes and other flaws that cause the item to be rejected from production.

Factory trials indicate that rubber processors will obtain better and more uniform dispersion with Cyanamid's new MBTS, at least within the time cycle currently used for mixing. In addition, there is the possibility that refining can be eliminated, the company states. In areas where current MBTS dispersion is acceptable, the processor may be able to realize economies by decreasing mixing time. American Cyanamid reports that its new product has been dispersed on a laboratory scale in up to half the time needed for other accelerators of this type. The result of an extensive basic research program begun early in 1958, the firm's new MBTS is a high purity, light color product. The special equipment designed to produce this new accelerator required a capital expenditure of well over $100,000, the company states.

Morrison Named Sales Engineer

► Rodney H. Morrison has been appointed a sales engineer for the Davis-Standard Division of Franklin Research Corp., Mystic, Conn. Mr. Morrison will handle Davis-Standard Thermatic Extruders for thermoplastic and rubber and accessory equipment to general extrusion accounts exclusive of wire insulating business. His sales territory extends from Long Island and metropolitan New York through New Jersey, Pennsylvania, Delaware, Maryland, the Virginias and North and South Carolina. Mr. Morrison has had extensive experience in the plastics field with the DuPont Polychemicals Division and with the Celanese Corp. of America. He has a B.S. degree in chemistry from Ohio State University.



The cleanness of the back roll (photo on left) shows the dispersibility of American Cyanamid's new MBTS accelerator. Other products of this type (photo on right) leave undispersed materials caked on the roll of the mill.

Buffalo Group Elects Officers

► The Buffalo Rubber Group elected its 1960 officers during its Annual Christmas Party on December 8, at the Buffalo Trap and Field Club in Buffalo, N. Y. The party was attended by 183 members and guests. During the election, the vote for vice-chairman resulted in a tie between Ed Sverdrup (U. S. Rubber Reclaiming) and Jack Wilson (Dow Corning). It was decided that both men will share the post in 1960 in view of the fact that the American Chemical Society will be holding its Spring Meeting in Buffalo.

The new 1960 officers of the Buffalo Rubber Group are: *Chairman,* Lawrence Halpin (Dunlop Tire & Rubber); *Vice-Chairman,* E. F. Sverdrup (U. S. Rubber Reclaiming) and Jack Wilson (Dow Corning); *Secretary-Treasurer,* Gene Martin (Dunlop Tire & Rubber); and *Executive Committee,* Neil Peffer (Buffalo Weaving and Belting) and Fran O'Connor (Linde).

Gordon Conferences Scheduled

► The 1960 Gordon Research Conferences will be held from June 13 to September 2, concurrently at Colby Junior College, New London, N. H.; New Hampton School, New Hampton, N. H.; and Kimball Union Academy, Meriden, N. H. The conference on "Elastomers—Structure and Properties," under the chairmanship of R. L. Zapp, will be held on June 20 to 24, at Colby Junior College. The "Polymers" conference, with E. M. Fettes as chairman will be held on July 4 to 8, also at Colby Junior College. Information about registration and accommodations can be obtained from Dr. W. George Parks, Director, Department of Chemistry, University of Rhode Island, Kingston, R. I.

Moves Rubber Chemicals Section

► Monsanto Chemical Co., St. Louis, Mo., has announced plans to move its Rubber Chemicals Development Section to Akron, Ohio. The move is expected to insure a maximum degree of technical coordination with the rubber industry and to permit the monitoring of new rubber chemical needs through close contact with research and development departments of customer companies. Transfer of the development function from its present location at Nitro, West Va., will be completed early next year with the relocation of Philip E. McIntyre, rubber chemicals development section manager, to Monsanto's Akron offices.

A native of Leonardo, N. J., Mr. McIntyre received a B. S. degree in industrial chemistry and an M. S. degree in organic chemistry from Kansas State College. He joined Monsanto in 1951 as a chemist in the Organic Division's Research Department and was transferred to the Intermediate Chemicals Section of the division's Development Department in 1953. In 1954, he advanced to his present position.

Churchill Names Agent

► Churchill Chemical Corp., Los Angeles, Calif., has appointed Can-Tite Rubber Corp., of Inwood, L. I., N. Y., as its eastern sales distributor. Can-Tite will handle the entire Churchill line of compounds for electrical potting, cable molding, sealing, encapsulating, insulating and fungus protection. Can-Tite plans to maintain a reserve of prepackaged, premixed, frozen tubed cartridges for rapid delivery to job sites or manufacturers' assembly lines. This service is intended to eliminate waste in the use of two component adhesives and sealants.

Dedicate Australian Carbon Black Unit

► Godfrey L. Cabot, Inc., Boston, Mass., and the United Carbon Co., New York, N. Y., recently held dedication ceremonies for Australian Carbon Black Pty., Ltd., Australia's first carbon black production facility. In the photograph above, S. C. Coleman, chairman of United Carbon, thanks the Deputy Premier of Victoria for officiating at the opening. Located at Altona, Victoria, about 11 miles from Melbourne, the new plant will have initial capacity of 30 million pounds, company officials point out.

The unit is expected to be able to supply all of Australia's current oil furnace black requirements. Previously that country imported approximately 16,000 tons of carbon black annually. The joint venture was designed and built by Cabot Engineering Co. Facilities on the 37 acre site include control and technical laboratories matching those in existence at the parent companies.

Goodrich Granted Safety Patent

► B. F. Goodrich Co., Akron, Ohio, has been granted a patent on diaphragms, or safety chambers, for use in automobile tires. The invention covers a molded rubber and fabric diaphragm which can be inserted in tubeless tires to provide a second air chamber for added safety if air should escape from the tire. Marginal flaps, seated between the tire and the rim, lock the unit securely in place. Production of the tires will be started by Goodrich early in 1960 and will be available to car manufacturers as original equipment and for the replacement market, the company said. The safety diaphragm was invented by Clarence E. Snyder, a Goodrich tire engineer, who has since retired. The application for patent was filed March 16, 1949.

New Long Mile Plant

► A new manufacturing plant for the Long Mile Rubber Corp., Dallas, Texas, is now under construction at Spartanburg, S. C. Scheduled to be on stream in January, 1960, the 35,000-square-foot plant will contain new machinery and equipment providing a manufacturing capacity of 6000 pounds of tread rubber per hour. Estimated cost of the plant is $600,000.

New Organization Formed

► Ralph B. Huber has announced the formation of a new company, R. B. Huber Associates, and the appointment of George C. Sheldon to the new organization. Mr. Sheldon was formerly sales manager for the Coatings & Adhesives Department of the Borden Chemical Co. and previous to that, he served in the same capacity at General Latex & Chemical and UBS Chemical. R. B. Huber Associates will function as manufacturers representatives serving customers in the paint, rubber and chemical fields in the sale of industrial raw materials. The office of the company is located at 216 Tremont Street, Boston, Mass.

Expands Polymer Division

► Research and development laboratory facilities for the Polymer Division of Petrochemical Corp. have been completed at Chemical Industries Park, Newark, N. J. The laboratories will be under the direction of Dr. Norman G. Gaylord, research and development vice-president of the Division. Expansion of the division's laboratory facilities are expected to enable the company to broaden and intensify its existing research and development programs which are aimed at adapting polymer technology to waxes and wax products.

Rubber Products at Chemshow

► Manufacturers of rubber products and equipment occupied a prominent place at the 27th Exposition of Chemical Industries held from November 30 to December 4 at the New York Coliseum in New York City. Thirty of the more than 500 displays featured products of interest to the rubber industry. Some of the major exhibitors were Enjay Co., Automotive Rubber Co., Colonial Rubber Co., Conneaut Rubber and Plastics Co. and Raybestos-Manhattan, Inc.

About 40,000 trade representatives visited the exposition to inspect new products and equipment with direct applications to the rapidly expanding fields of missiles, nucleonics, electrochemicals, petrochemicals and ceramics. A noteworthy factor in this year's show was the heavy emphasis on more highly resistant chemical processing equipment. The show was dominated by many working models of equipment manufacturers demonstrating automatized process systems designed to withstand higher pressures, higher temperatures and more corrosive conditions.

Instruments and metering devices also received greater attention this year. For example, C. W. Brabender Instruments Inc. introduced an instrument for measuring the plasticity of coal, ceramics, polymers or other materials at temperatures as high as 650° C. Eco Engineering exhibited a new device for valving small flows of viscous materials. Brookfield Engineering Laboratories displayed a new line of instruments for continuous indication, recording and control of viscosity under process conditions.

Acid-proof rubber linings and a corrosion resistant flexible rubber pipe were shown by Raybestos-Manhattan. The versatility of butyl products was underlined at the Enjay booth which held a full complement of sound-damping tires. Chemicolloid Laboratories, Inc., highlighted its colloid mills and their uses in latex compounding. Consultation in materials handling offered by the staff of Sprout, Wa[illegible]on & Co., Inc., included information on the firm's cutters, crushers, sifters and shakers and reclaim processing systems. The Automotive Rubber Co. exhibit featured metals lined with various elastomers having a high resistance to caustic solutions, chemicals and abrasion.

Goodrich-Gulf Moves Office

► Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has announced the removal of its Cleveland general office from 3121 Euclid Ave., Cleveland 15, Ohio, to 1717 East Ninth Street, East Ohio Building, Cleveland 14, Ohio. The new telephone number is TOwer 1-3500.

Sale of Acme-Hamilton Restrained

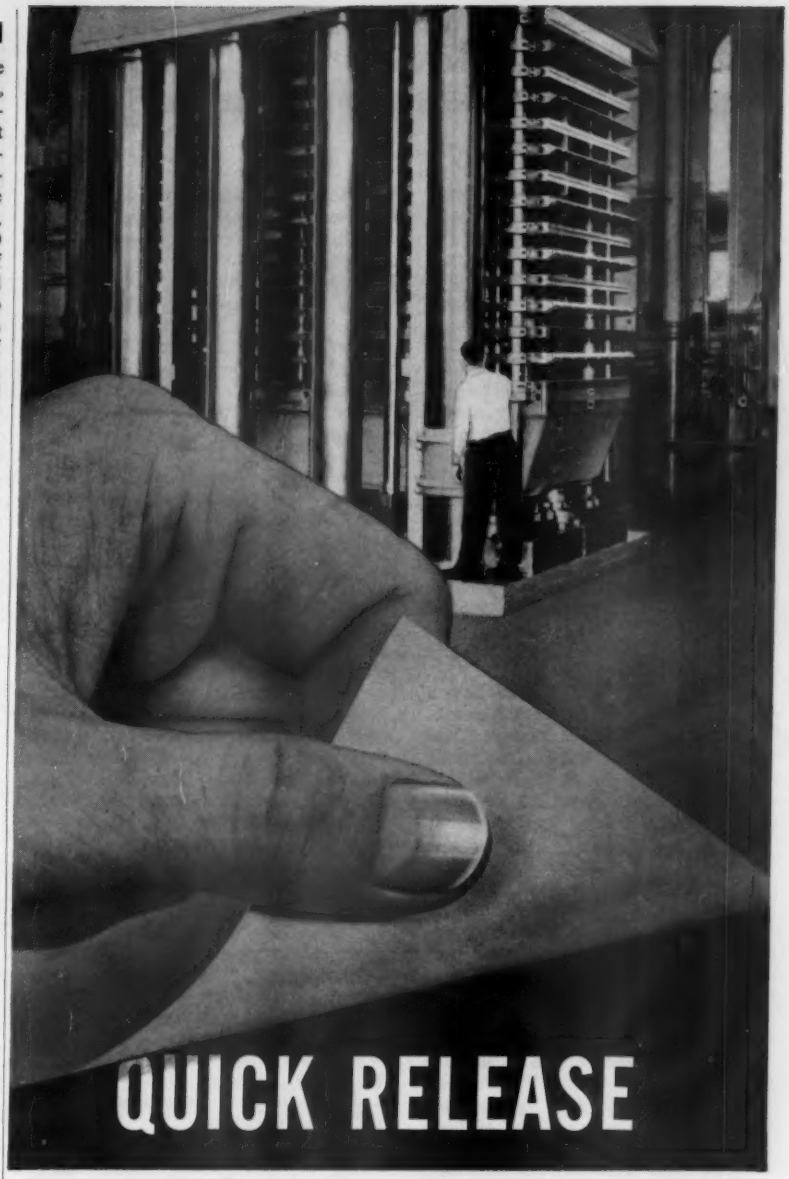
► Stockholders of retail furniture chain, Spear & Co., New York, N. Y., have approved the acquisition of Acme-Hamilton Manufacturing Corp., but one of the two holders in Acme-Hamilton obtained a restraining order barring the transfer of assets. Under the contract approved by Spear holders, that company would pay 2,266,000 shares of common for the assets of Acme-Hamilton. Spear's chairman and president, Albert M. Kahn, is also owner of about 77 per cent of Acme's capital stock. The other holder of Acme shares is Albert Kahn's brother, Herman Kahn. Herman Kahn has filed papers in the Delaware Chancery court at Wilmington which charge "The proposed terms of sale of the assets of Acme to Spear are grossly unfair, unreasonable, discriminatory and constitute a fraud upon the minority stockholder of Acme." In the Spear proxy statement, it was stated that Albert Kahn owned 47 per cent of Spear and would own 66 per cent of the company following the acquisition.

Issues Natural Rubber Booklet

► A new booklet called "Compounding Natural Rubber for Heat Resistance" has been released by the Natural Rubber Bureau, Washington, D. C. This booklet describes a group of new heat resistant compounds developed in the laboratories of the British Rubber Producers' Research Association. Some of the properties examined for the effect of high temperature aging are tensile strength and elongation at break measured at 20°C. and 100°C.; modulus measured at 20°C. and 100°C.; and resistance to compression set. Five techniques developed by industry scientists which are listed include: Use of a "sulfurless" curing system; Use of an antioxidant conferring high heat resistance; Use of dithiocarbamate as a protective agent; Use, in some cases, of an antioxidant of the type sometimes known as "deactivator"; and Selection of an appropriate filler. For a free copy, write Natural Rubber Bureau, 1631 K St., Washington 6, D. C.

Appoints Sales Representatives

► Landers-Segal Color Co., Brooklyn, N.Y., has announced the appointment of sales representatives for the Michigan and New England areas. T. L. Peterson Co., 3049 E. Grand Blvd., Detroit, Mich., will represent the firm in Michigan, while the T.H. Cushman Co., 339 Auburn St., Auburndale, Mass., will serve as company representative in New England. These firms will have charge of the sale of Landers-Segal's Lansco dry colors, water dispersions and flushed colors to the manufacturing industries in their respective areas. Price lists and technical data are available through those offices.



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Names in the News

William A. Jarvey, formerly technical service supervisor, has been named product manager of the Vinyl Plasticizer Department of Archer-Daniels-Midland.

W. E. Greene, chairman of the board of directors of W. E. Greene Corp., has been re-appointed chairman of the Rubber Division of the New York City Cancer Committee's 1960 April Cancer Crusade.

George B. Koch, Jr., has been appointed advertising manager of industrial and commercial products for the B. F. Goodrich Co.

Albert C. Brooks has been named manager of the Baltimore Sales Division of U. S. Industrial Chemicals Co. succeeding **James F. Whitescarver** who has retired after 30 years of service.

John W. Brownley, previously executive vice-president of Industrias Consolidadas de Matanzas, Cuba, has joined Industrial Rayon Corp. as staff assistant to the vice-president and general manager.

William J. Luby has been elected vice-president in charge of finance for Central Scientific Co. and **Donald E. Wilson** has been appointed assistant treasurer and controller of the company.

Elwyn H. Pfaender has been appointed a sales representative for cement-asbestos board products by the Fibrous Products Division of Union Asbestos & Rubber Co.

Roger S. Firestone, president of Firestone Plastics Co. and a director of Firestone Tire & Rubber Co., has been elected president of United Cerebral Palsy's Research and Educational Foundation, and vice-chairman of the board of directors of United Cerebral Palsy Associations.

E. L. Babcock, previously sales promotion manager, has been appointed sales manager of Gro-Cord Rubber Co.

Frederick B. Downing, of E. I. du Pont de Nemours & Co., has retired after 40 years with the company.

Dr. Ronald A. Krause has been named a research scientist in the Polymer Chemistry Section of the American Cyanamid Co.

Dr. William R. Peterson, formerly with Continental Can Co., has been named supervisor of polymer research at United Carbon Co.

Dr. Harold W. Ritchey, vice-president and technical director, and **Joseph Jorzak,** vice-president in charge of the Specialties Division of the Thiokol Chemical Corp., have been elected directors of the company.

Charles D. York, formerly manager of accounting at the Tuscaloosa, Ala., plant of the B. F. Goodrich Tire Co., has been named to the post of staff superintendent for the firm.

William F. Coulter, director of automotive and marine sales for Rubbermaid, Inc., has been elected to the new post of vice-president of automotive and marine sales.

O. V. Tracy, president of the Standard Oil Co., has been named a director of the Newark College of Engineering Research Foundation.

Professor Charles G. Overberger, head of the Chemistry Department at Polytechnic Institute of Brooklyn, has been elected chairman of the Division of Polymer Chemistry of the American Chemical Society for 1960. **Dr. Turner Alfrey Jr.,** of Dow Chemical, has been named vice-chairman and **Dr. F. H. Winslow** of Bell Telephone Laboratories, has been re-elected secretary.

Homi Kapadia, who has been active in international affairs, has been named director of overseas marketing for the Mount Hope Machinery Co.

Dr. Rush F. McLeary, who has served as general manager of the Research and Development Department of the Jefferson Chemical Co., has been elected to the newly created post of vice-president of research and development for the company.

Edward J. Higgins, formerly assistant general manager of the International Division of the U. S. Rubber Co., has been named general manager of that division, succeeding **Ludwig C. Boos,** who died recently.

Jean F. Malone, who has served with the B. F. Goodrich Chemical Co. since 1946, has been appointed sales development manager of plastic materials for that company.

Robert H. Ostrander, formerly with the U. S. Rubber Co., has joined the Eco Engineering Co. as application engineer.

E. J. O'Leary, president and chairman of the Rubberoid Co., has been elected a director of the Cumberland Chemical Corp.

Page M. Bullock

Promoted by Cabot

► Godfrey L. Cabot, Inc., Boston, Mass., has announced the appointment of Page M. Bullock to the carbon black technical sales staff. He will serve at Cabot sales offices in Akron, Ohio. Mr. Bullock joined the Cabot organization in 1965 and during the past two years has been representing the Minerals & Chemicals Division in sales of company products to customers in the Akron area. He will now devote his time exclusively to sales of carbon black, continuing to service customers from the Akron offices.

A native of Swarthmore, Penna., Mr. Bullock attended George Preparatory School in Bucks County and Hampden-Sydney College in Virginia, where he was graduated in 1948 with a B. S. degree. Following graduation, he joined the sales staff of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. In 1950, he joined Merck & Co., Inc., Rahway, N. J., as assistant to the general sales manager. In 1953, he was assigned to the Industrial Chemicals Division of Merck, where he was northern New York state sales representative until joining Cabot in 1956. Mr. Bullock is a member of the University Club of Akron, Fairlawn Country Club, Akron Rubber Group (A. C. S.), Fort Wayne Rubber and Plastics Group and the Southern Rubber Group.

A. D. Lumsden, formerly product sales manager of the Wire Products Department for Hewitt-Robins, Inc., has been appointed manager of operations of the Wire Products Department.

Edward R. Bartley, who has been with the B. F. Goodrich Co. since 1953, has been named to the newly created post of manager of marketing research for the company.

William E. Bigglestone, previously with the National Archives, has joined Firestone Tire & Rubber Co. as the company archivist.

Detroit Group Installs Officers During Annual Christmas Party

► The Detroit Rubber and Plastics Group installed its 1960 officers and directors during its Annual Christmas Party on December 11 at the Hotel Statler Hilton in Detroit, Mich. The party was attended by 650 members and guests, who were treated to a full program of entertainment. The 1960 officers and directors are: *Chairman,* Walton D. Wilson (R. T. Vanderbilt); *Vice-Chairman,* S. Miller Sidwell (Chrysler Corp.); *Secretary,* Richard W. Malcomson (DuPont); *Treasurer,* Phillip V. Millard (Automotive Rubber); *Directors,* W. F. Miller, E. J. Kvet, Jr., and H. W. Hoerauf; *Program Chairman,* R. C. Waters; *Assistant Program Chairman,* P. Weiss; *Assistant Secretary,* E. Francis; *Publicity Chairman,* C. E. Beck; *Historian,* T. W. Holloran; *Membership Chairman,* J. Masden; *Assistant Membership Chairman,* E. I. Bosworth; *Education Committee Chairman,* R. Snyder; *Assistant Treasurer,* F. Falvey; *Entertainment Chairman,* R. C. Chilton; *Assistant Education Committee Chairman,* C. H. Albers, and *Program Committee Member,* J. McClellan.

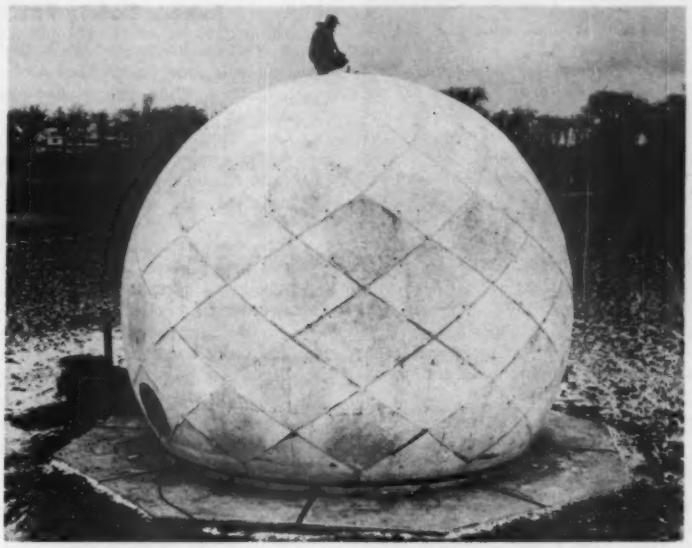
Lee Promotes MacIntire

► J. A. MacIntire, Jr., has been promoted to the position of general sales manager of Republic Rubber Division of the Lee Rubber and Tire Corp., Youngstown, Ohio, to fill the office made vacant by the recent death of C. R. Conklin. Mr. MacIntire joined Republic in 1953 as assistant manager of wire braid hose sales. In 1954, he was appointed Chicago district manager and in 1955, he returned to Youngstown as manager of wire braid hose sales, which position he has held since.

Mr. MacIntire started his career in the industrial rubber products industry in 1928 as a sales representative for the L. H. Gilmer Co. of Philadelphia and later spent 14 years with the Quaker Rubber Corp., also of Philadelphia. During the Korean conflict, he was stationed in Washington, D. C., as a member of the staff of the Production and Requirements Branch of the Rubber Division of the National Production Authority.

Axel Develops Mold Release

►Axel Plastics Research Laboratories, Brooklyn, N. Y., has announced the development of a new type mold release, designated Mold Wiz I-C, for isocyanate (polyurethane) foams. According to the company, Mold Wiz is safe and easy to handle, non-flammable, non-toxic, non-corrosive, non-explosive, and non-staining. Mold Wiz is a film-forming release agent and can be sprayed, brushed or wiped on, the company states.



Canada Builds Polyurethane Radome

► Designed to meet a growing need for ground shelter providing greater dielectric "transparency" to minimize energy loss and boresight error in radar tracking installations, the world's first polyurethane foam radome has been erected at Ottawa, Ontario, by the National Research Council of Canada. The radome, including joints is constructed entirely of foam. With an equatorial diameter of 26½ feet, the structure consists of 115 pre-molded rigid Hetrofoam panels in nine different geometric shapes and sizes molded by Long Sault Woodcraft Ltd., St. Andrews East, Quebec, Canada.

To facilitate erection and to help hold the panels in place, temporary U-shaped pin fasteners were hammered into pre-drilled holes. Following this mechanical erection, the panels were "welded" into a continuous foam structure by using additional polyurethane foam as joint mortar and at the same time, the temporary locking pins were removed. The design requirements of the National Research Council called for the use of a fire-resistant polyurethane foam, a requisite which the fabricator met by using Hetrofoam 10 resin, a product of Hooker Chemical Corp., Niagara Falls, N. Y. It is reported that the use of Hetrofoam 10 resin represents a pioneering step in the construction of shelters more dielectrically "transparent" to minimize energy loss and boresight error.

FTC Complaint Dismissed

►A complaint filed by the Federal Trade Commission in January, 1956, against the B. F. Goodrich Co., Akron, Ohio, was ordered dismissed in an initial decision recently filed by F. T. C. Hearing Examiner Earl J. Kolb. The complaint charged that certain contracts between Goodrich and the Texas Co. were unlawful. These contracts provided that Goodrich pay the Texas Co. a sales commission on all tires, batteries and accessories sold by Goodrich to Texaco dealers. The Hearing Examiner found that such contracts were not unlawful and that sales commissions paid by Goodrich to the Texas Co. were based upon substantial services performed by that company in the promotion and sale of Goodrich brand tires, batteries and accessories.

DuPont Forms German Company

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced that together with Sachtleben, A.G., Cologne, Germany, the company has formed a jointly-owned German firm, Pigment-Chemie, G.m.b.H., for the manufacture and sale of titanium dioxide pigments. The initial capital of the newly-formed company is $8,330,000, of which Sachtleben will own 74 per cent and DuPont 26 per cent. According to DuPont, a plant will be built by Pigment-Chemie at Homberg on the Rhine. The new plant is expected to begin operations in about two years, having an initial capacity of 40 million pounds a year. The German company will supply titanium dioxide pigments to rubber industries in Western Europe and some other areas.

Akron Rubber Group Announces 1960 Rubber Lecture Series

► Akron Rubber Group, Akron, Ohio, in connection with the University of Akron, has announced the program for its revised series of rubber product compounding lectures for the Spring term of 1960. Dr. Glenn Alliger (Firestone) will serve as coordinator for the 13 lecture-discussion meetings which will be held on the campus of the University of Akron. According to the group, this series is specifically designed for persons in sales, purchasing, marketing, production and allied fields as well as for technical people. A background in compounding and chemistry is not necessary.

Lecture Schedule

The schedule of the series, which began on January 11, is: *January 11,* "Chemistry and Physics of Polymers—Advanced," Dr. Maurice Morton (University of Akron); *January 18,* "Compounding to Service Specifications—Including Costs," James W. Hostettler (General Tire & Rubber); *January 25,* "Compounding for Special Application—Including Oil and High Temperature," N. Graver Duke (Goodrich Chemical); *February 1,* "Compounding Mechanical Goods—Including Extruded and Molded Parts, Gromats, Etc.," John Brothers (Ohio Rubber); *February 8,* "Compounding of Tires and Related Products," Kenneth Garvick (Mansfield Tire & Rubber); *February 15,* "Wire and Cable-Compounding, Processing and Curing," Dr. Joseph B. Littman (Packard Electric); *February 22,* "Compounding of Sponge Products—Closed and Open Cell, Polyurethane," Dr. Calvin Yoran (Dryden Rubber); *February 29,* "Latex and Elastomeric Foam Technology," Thomas Rodgers (Goodyear); *March 7,* "Compounding Colored Items—Household Products, Drugs, Sundries, Etc.," Clyde H. Jones (Rubbermaid); *March 14,* "Rubber-To-Metal Bonding," Peter J. Larsen (Lord Mfg.); *March 21,* "Rubber Manufacturing Equipment," H. A. Gallagher and C. R. Washburn (Goodyear); *March 28,* "Statistical Quality Control," Edward M. Bader (Goodrich); and *April 4,* "Plant Trip—Seiberling Rubber Co."

First Dance Successful

The Group held its first dance on November 6 at the Sheraton Hotel in Akron, Ohio. Approximately 350 couples attended the dance, and every lady received an orchid corsage from the Dance Committee. Dance music was furnished by Tex Beneke and his orchestra. The dance was an outstanding success due to the efforts of the Dance Committee, which included: M. H. Leonard (Columbian Carbon), group chairman; I. J. Sjothun (Firestone), group vice-chairman; C. W. Stalker (General Tire), group treasurer; J. H. Gifford (Witco Chemical), group secretary; R. F. Loges (Columbian Carbon), Publicity Committee; W. E. Ford (Columbian Carbon), Dance Committee chairman; and W. G. Kitzmiller (Columbian Carbon), Dance Committee.

Rubber Safety Posts

► Rubber Posts that look like iron will soon be installed along a double white center line on Ardsley Road in the Town of Greenburgh, N. Y. Arthur Freed, traffic engineer for Westchester County said that the "fence" was designed to reduce accidents along a quarter-mile stretch of the road west of the Scarsdale rail road station, which is known locally as "Breakneck Hill". The road drops twelve feet for every hundred and doubles back on itself twice in descending the hill. Hundreds of accidents, including head-on collisions, have been recorded.

To Hold Testing Symposium

► Plas-Tech Equipment Corp., Natick, Mass., will hold its Second Annual Symposium on High Speed Testing, on January 27, 1960, at the Somerset Hotel in Boston, Mass. Prof. A. G. H. Dietz (Massachusetts Institute of Technology) and Prof. F. R. Eirich (Polytechnic Institute of Brooklyn) will serve as symposium co-chairmen. Seven papers will be presented at the symposium including: "New High Speed Tensile Tester for Polymer Films," by Gordon D. Patterson, Jr. (DuPont); "Smokeless Powder Testing of Polyurethane Foams at Rates of from 1 to 10^5 inches/inch/minute," by John W. Jones (DuPont); "Response of Elastomers, Over a Wide Frequency Range, to a Variety of Forcing Functions," by Martin Berger (Esso Research & Engineering); "High Speed Testing of Solid Propellants," by K. H. Sweeney and Kenneth Bills (Aerojet-General); "Problems Associated with Strain Measurements of Textiles under Impact Loading Conditions," by Stanley Backer and Jan Rizek (Massachusetts Institute of Technology); "Critical Comparison of Moving Bar Impact with Gas Expansion Machines for Dynamic Loading of Metals," by Joseph M. Kraft (United States Naval Research Laboratory); and a subject to be announced later, which will be presented by Dr. James N. Brennan (United States Navy Nuclear Ordnance Unit).

Fort Wayne Group Holds Panel on Reclaimed Rubber

► The Fort Wayne Rubber & Plastics Group held its second meeting of the 1959-1960 season on December 3 at the Van Orman Hotel in Fort Wayne, Ind. The technical program consisted of a panel discussion on reclaimed rubber, its manufacture, use and advantages, with special attention given to new developments. Panel moderator was Don L. Zimmerman (U. S. Rubber). The panel members and their subjects were: John M. Ball (Midwest Rubber Reclaiming), "What is Reclaimed Rubber and How is it Made?"; Paul J. Mester (Naugatuck Chemical), "What Types of Reclaimed Rubber are Available?"; W. R. Macy (B. F. Goodrich), "How is Reclaimed Rubber Used in Tires and other Transportation Items?"; John E. Brothers, (Ohio Rubber) "What are the Merits of Reclaimed Rubber in Molded Goods and other Non-Transportation Items?"; G. Croft Huddleston (U. S. Rubber Reclaiming), "What are the Major Reasons for Using Reclaimed Rubber?"; and John E. Misner (Xylos Rubber), "What are Pre-Mixes and How Can They Best be Used?" Abstracts of the panel's subjects appeared in the March 1959, issue of RUBBER AGE, page 1005. A question and answer period followed the panel discussion.

Phillips Promotes Head

► A. J. Head has been promoted to manager of the Phillips Chemical Co., a wholly owned subsidiary of Phillips Petroleum Co., Bartlesville, Okla. Mr. Head has been manager of the Manufacturing Divisions of Phillips Chemical. A native of Oklahoma City, he graduated from the University of Oklahoma with a B.S. degree in mechanical engineering. He started at Phillips in 1937 and in 1951, became superintendent of the firm's Philblack plant at Borger, Texas. Four years later, he transferred to Bartlesville and in 1957, Mr. Head was appointed to the position he held prior to his most recent promotion.

Expands Warehouse Facilities

► Ohio Rubber Co., Willoughby, Ohio, has announced completion of an expansion program that more than doubles the tire warehouse facilities of its Conneautville, Penna., plant. According to the company, by utilizing the most modern concept of warehouse design, the new facility will enable it to vastly expand its inventory of finished agricultural, semi-pneumatic and juvenile tires. Along with the warehouse expansion, shipping dock facilities were extended to accommodate a greater volume of business efficiently and quickly, the company states.

L. G. Turk

Appointed Division Manager

► L. G. Turk has been appointed manager of the Rubber Machinery Division for the National Rubber Machinery Co., Akron, Ohio. Formerly operating manager of the company's Plastic Machinery Division, Mr. Turk has been associated with NRM for six years. He holds a mechanical engineering degree from Carnegie Tech and has an extensive background in engineering and sales management. The company has also announced the appointment of W. G. Potts as assistant manager of the Extruder Sales Division. Mr. Potts brings 14 years of experience with NRM in plastics engineering and sales to his new post. He majored in industrial engineering at the University of Akron and, prior to his new assignment, served as a sales engineer for NRM.

Names Sales Representatives

► The appointment of two new sales representatives has been announced by Tumb-L-Matic, Inc., Stamford, Conn. Thomson and Willett Co. of Haverford, Penna., has been assigned the eastern Pennsylvania, southern New Jersey, Delaware and Maryland territory. Joseph Upton, Jr. will cover metropolitan New York, northern New Jersey and the Hudson Valley section as far north as Schenectady. The addition of Thomson and Willett and Mr. Upton mark the first step in the firm's new marketing program which calls for the completion of national sales coverage by September 1960.

New Firm Makes Rubber for Oil

► Another company has been added to the growing number of rubber manufacturers in the South by the founding of Tulsa Rubber Co., 52nd and Garnett Road, Tulsa, Okla. Incorporated on June 5, 1959, the firm is specializing in rubber and plastic products for the oil field industry. Its officers are: Leo W. Fagg, president, A. A. Guthrie, vice-president, and Clarence Glasgow, secretary-treasurer.

Emery Reorganizes Development

► Emery Industries, Inc., Cincinnati, Ohio, has announced reorganization of its Development and Service Department, as a result of the company's growth in the oleochemical derivatives field. Walter T. Meinert will resume his duties as director of the department after a temporary assignment on a special market development project. Heading the three major sections will be Robert D. Aylesworth, manager of applications research; John D. Farr, in charge of products development; and Robert H. Dhonau, coordinating technical services.

Mr. Meinert has been with Emery since 1949, assuming his present position in 1956. Mr. Aylesworth joined the company in 1946 as head of the Development and Service Laboratory, the precursor of the Applications Section. Mr. Farr served as acting director of Development and Service during Mr. Meinert's absence, having entered the department when he joined Emery in 1953. Mr. Dhonau joined the department in 1956, ten years after beginning in the company's Development and Service Laboratory.

International Conference Proceedings Available

► Complete copies of the Proceedings of the International Rubber Conference held on November 8 to 13 in Washington, D. C., have now been made available through the cooperation of the three sponsoring societies, the Division of Rubber Chemistry of the American Chemical Society; Committee D-11 on Rubber and Rubberlike Materials of the American Society for Testing Materials, and the Rubber and Plastics Division of the American Society of Mechanical Engineers. Members of each of the three societies may obtain copies of the Proceedings for $10.00 each (postpaid). Nonmembers may obtain copies for $12.50 (postpaid). Those desiring copies should address their requests to the appropriate organization:

Rubber Division, A.C.S.—George Popp, c/o Phillips Chemical Co., 318 Water St., Akron 8, Ohio.

Committee D-11, A.S.T.M.—R. E. Hess, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna.

Rubber and Plastics Division, A.S.M.E.—T. J. Marshall, Jr., American Society of Mechanical Engineers, 29 West 39th St., New York, N. Y.

Frederick J. Bueche

Joins University of Akron Staff

► Dr. Frederick J. Bueche has joined the University of Akron staff as a research associate in the Institute for Rubber Research and as professor of polymer physics. Dr. Bueche was formerly associated with the University of Wyoming, where he had been professor of physics since 1953. Prior to that, he was associated with Rohm and Haas, Philadelphia, Penna., as a research physicist. He received his bachelor's degree from the University of Michigan in 1944 and his doctorate from Cornell University in 1948. Since then, he has had more than 40 articles published in professional and scientific journals.

Mohawk Plans Split

► Directors of the Mohawk Rubber Co., Akron, Ohio, have proposed a two-for-one common stock split and an increase in the dividend rate on the new shares. Stockholders were asked on November 18 to approve the split and to increase authorized shares from 350,000 to 1,000,000 shares. After approval of the split, directors planned to establish a quarterly dividend rate of 25¢ a share, which would be equal to 50¢ a share on present shares. Payments of 35¢ have been made in recent quarters. The split and the 25¢ dividend would be payable December 19 to stockholders of record November 21.

Taylor Instrument Plans Move

► Taylor Instrument Co. has leased a factory building at 557 E. Talmadge Ave., Akron, Ohio, and will move there as part of an expansion program. Located on a 2½ acre lot, the building will double Taylor's manufacturing space, and leave room for further expansion. The building is 80 by 200 feet in size and has 16,000 square feet of space on a single floor. Office space must be built. The entire building will be renovated. The firm expects to start moving its operations in February.

► Members of the Thirty Year Club of the Rubber Trade Association at its annual Christmas party, which was held on Tuesday, December 8. Each club member brought a guest who was either a protege, member of the family, or a friend and a total of eighty were present at the dinner. The club includes 48 members, all of whom are either owners, manufacturers, traders, buyers or sellers. Many of the members have been in the business for the past fifty years.

Plans New Facilities

► Mobay Chemical Co., Pittsburgh, Penna., plans a third major expansion of its isocyanate facilities. The proposed expansion, scheduled for completion in July, 1960, will raise Mobay's annual capacity to over 25 million pounds for tolylene diisocyanate (TDI), one of the principal chemicals used in the manufacture of urethane foams, solid elastomers and protective coatings. Mobay's second expansion, raising its TDI capacity from 12 million to 18 million pounds, is now nearing completion at its New Martinsville, West Va., plant locations and is expected to be in operation within 60 days.

Work on the new expansion will begin immediately, the company said, to keep pace with a market demand for isocyanates. The rapidly-paced Mobay expansions are due to the recent growth of urethane product markets coupled with new developmental fields currently being explored for isocyanate-modified products. Mobay, a jointly-owned associate company of Monsanto Chemical Co. and Farbenfabriken Bayer of West Germany, also recently announced construction of a plant to manufacture Merlon polycarbonate resin, a highly-stable thermoplastic developed to meet the rigid requirements of the electronics industries.

Acquires Lord Chemical

► Wheelabrator Corp., Mishawaka, Ind., has acquired approximately 80 per cent of the controlling stock of the Lord Chemical Corp., York, Penna. As a majority-owned subsidiary of Wheelabrator, Lord Chemical will continue to operate in York, manufacturing its line of vibratory and barrel type finishing equipment, including compounds and media for cleaning, deburring, and precision finishing of metal parts.

Wheelabrator entered the precision finishing field in 1958, when it organized its Techline Division in Vicksburg, Mich. The combination of the Techline and Lord Chemical lines is expected to provide the most complete range of wet and dry precision finishing equipment available. Officers of Lord Chemical include James F. Connaughton as *Chairman of the Board;* H. R. Stitely, *President* of Lord; J. A. Schmidt, *Secretary-Treasurer* of Wheelabrator, elected to *Vice-President-Treasurer* of Lord; H. E. Smith, elected to *Secretary* of Lord; and J. M. Wolf, *Controller* at Wheelabrator, appointed *Controller* of Lord. The *Board of Directors* includes James F. Connaughton, J. A. Schmidt, and H. R. Stitely.

Develops Urethane Resin Systems

► Baker Castor Oil Co., Bayonne, N. J., has developed new low-cost urethane resin systems based on especially modified castor oil derivatives to provide an easier-to-handle, more economical method of foaming-in-place rigid and semi-rigid urethane foams for thermal and acoustical insulation, packaging, core construction and similar applications. The urethane resin systems employed in the Baker method are said to reduce the cost of foam preparation by avoiding the manufacture of a prepolymer, substituting components of almost equally low viscosity that can be easily foamed from a newly available compact lightweight dual-headed spray gun employing air pressure. Utilizing the new type spraying equipment is said to eliminate the need for proportioning pumps, thus reducing equipment cost to 20 per cent of previous methods.

Boston Group Elects Officers

► The Boston Rubber Group held its Annual Christmas Party on December 11, at the Somerset Hotel in Boston, Mass., at which time the results of the election of its 1960 officers were announced. The group officers for 1960 are: *Chairman,* James J. Breen (Barrett & Breen); *Vice-Chairman,* George E. Herbert (Tyer Rubber); *Secretary-Treasurer,* John M. Hussey (Goodyear); *Executive Committee,* George E. Hunt (Simplex Wire & Cable); Robert Loveland (R. T. Vanderbilt); William H. King (Acushnet); and Bernard H. Capen (Tyer Rubber).

A new attendance record for the Christmas Party was set when 650 members sat down to the usual lobster or turkey dinner, which was held in the Louis IV ballroom. Following the dinner, the members were entertained by a floor show highlighted by the nationally famous act of Black & Nolan. Door prizes were awarded to 252 lucky ticket holders.

Plant Capacity Increased

► Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn., reports that the capacity of its Marvinol vinyl resin plant in Painesville, Ohio, has more than tripled since the plant was acquired ten years ago. The company also announced that an additional expansion program is underway which will raise the plant's capacity by more than 30 per cent. When the project is completed in July, the plant will have an approximate capacity of 65 million pounds annually, the company states. The Painesville plant, the only vinyl production unit of the company, currently produces 13 different types of vinyl resins including the plastisol grades.

R.I. Rubber Club Elects Officers

► The Rhode Island Rubber Club elected its officers and directors for 1960 during its Fall Meeting on November 5 at the Pawtucket Golf Club, Pawtucket, R. I. The meeting was attended by 173 members and guests. A pre-dinner technical session was held during the meetings which featured John E. Morrow (Sun Oil), who spoke on "A Guide to the Selection of Rubber Process Oils." Arthur A. Dunn (State Mutual Life Assurance) presented an after dinner talk on "Human Relations on the Job."

The 1960 officers and directors of the Rhode Island Rubber Club are: *Chairman,* Harry L. Ebert (Firestone Rubber & Latex); *Vice-Chairman,* Walter Blecharczyk (Davol Rubber); *Secretary-Treasurer,* Edwin S. Uhlig (U. S. Rubber); *Directors,* Ralph B. Robitaille (Phillips Petroleum); Joseph Vitalle (Crescent Wire), C. A. Damicone (Acushnet), Joseph M. Donahue (Goodyear), and Paul Hastings (Kleistone Rubber); and *Permanent Historian,* Roy G. Volkman (U. S. Rubber).

In his talk, Mr. Morrow discussed the three types of oils currently available, paraffinic, naphthenic and aromatic, and the means by which they are produced. He outlined their chemical composition pertaining to molecular structure and explained the procedure by which molecular structure can be determined by knowing only the viscosity, gravity and refractive index of the oil. Mr. Morrow also showed how some of the properties of the finished rubber compound are affected by oil composition.

Industrial Pneumatic Tire

► U. S. Rubber Co., New York, N. Y., has introduced a new industrial pneumatic tire which is reinforced by thousands of short steel fibers. The tire has been designed for use on materials handling trucks, industrial tractors and trailers and other heavy duty application, it is reported. According to U. S. Rubber, the steel reinforcement was specifically designed to protect the tread and sidewalls of the new tire against cuts, ruptures and punctures in the most severe service conditions, thus reducing vehicle down time due to tire trouble and lowering materials handling costs in factories, warehouses and storage yard areas. The tire, called the U. S. Royal S.R.T. Grip-Matic, is said to give excellent mileage due to high quality rubber compounds and the stability of the steel supported tread, and can be retreaded more times than a conventionally built tire. The Grip-Matic is made with rayon cord in the four sizes most used on materials handling equipment: 6.00/6.90-9; 7.00-12; 7.50-10; and 7.50-15. All are of 10 ply rating except the 7.00-12, which has a 12 ply rating.

Robert W. Munson

Promoted by N. J. Zinc

► Robert W. Munson has been appointed assistant eastern district sales manager by the New Jersey Zinc Co., New York, N. Y. His principal assignment will be the supervision of the company's pigment sales activities in the southern area of the eastern district. Mr. Munson started with the company in 1947 as a sales representative in the Los Angeles office. He was made district sales manager for the West Coast in 1952 and the following year, he was transferred to the pigment sales organization in New York. He is an alumnus of the University of California.

Goodrich Footwear Names Two

► B. F. Goodrich Footwear and Flooring Co., Watertown, Mass., has appointed J. Craig Cameron as manager of technical services, and George J. Jones as technical superintendent of footwear, succeeding Mr. Cameron. Mr. Cameron graduated from the University of Maine in 1937 with a B.S. degree in chemical engineering, and immediately joined Goodrich Footwear, and then Hood Rubber Co., as a laboratory chemist. In 1953, he was appointed superintendent of industrial products, and in 1958 he was named technical superintendent of footwear. Mr. Cameron is a member of the American Chemical Society; the Rubber Division, ACS; and the Boston Rubber Group.

Mr. Jones graduated from Bowdoin College in 1930 with a B.S. degree in chemistry, and then joined Goodrich Footwear at the Watertown plant. He advanced to technical aide, and in 1940 was appointed technical supervisor of war products. In 1947, he was appointed supervisor of rubber and canvas footwear, and in 1959 was named technical superintendent of process. Mr. Jones is a member of the Boston Rubber Group.

Directs Educational Relations

► Dr. Albert W. Meyer has been named to direct the college and university relations program and technical recruiting for the Research Center at Wayne, N. J., for the U. S. Rubber Co. Dr. Meyer, who has been leader of radiation research at Wayne for the past two years, will visit colleges and universities throughout the country to encourage undergraduate and graduate students to choose careers with his company.

After his graduation from the University of Chicago in 1927, Dr. Meyer received his Ph. D. degree in physical chemistry at Chicago in 1930. He was with DuPont for four years before he joined U. S. Rubber in 1934 to direct research work on synthetic rubber and plastics. In 1954, Dr. Meyer became director of exploratory research for the Diamond Alkali Co. and established a radioisotope tracer laboratory and a cobalt-60 source for radiation studies. He rejoined the Research Center staff in 1957.

Dr. Meyer holds seven patents, has delivered several technical papers and has lectured at New York University. He has been active in the American Chemical Society and is now chairman of the section evaluation committee of the North Jersey section.

Buys Division of Sawyer-Tower

► The board of directors of Farrington Manufacturing Co., Needham Heights, Mass., has approved the acquisition of the Coated Fabrics Division of Sawyer-Tower, Inc., Watertown, Mass. Purchase price of the acquisition, a cash transaction, has not been disclosed. Jacob Saliba, president of Sawyer-Tower, will take over the newly created post of executive vice-president of the Packaging Division of Farrington.

The acquisition is expected to provide additional capacity for the subsidiary Farrington Texol Corp., Walpole, Mass., by adding the vinyl coating of fabrics to Textol's line of pyroxylin-coated fabrics. The Coated Fabrics Division of Sawyer-Tower, a 60 year pioneer in the field, is said to be the largest vinyl coater of fabrics for the aircraft and missile industry in the United States. This is the third acquisition in 1959 for Farrington. The company acquired the Intelligent Machines research Corp., Alexandria, Va., in March and Printed Electronics Corp., Natick, Mass., a month later.

► Gering Plastics Division of Studebaker-Packard Corp., Kenilworth, N. J., has developed an improved Ger-Pak polyethylene separator film for the rubber tire industry and manufacturers and processors of mechanical rubber goods. Detailed specifications are available in Technical Data Bulletin No. 959.

Financial News

Columbian Carbon

► Nine months ended September 30: Consolidated net earnings amounted to $5,226,000, compared with $2,344,000 during the comparable period of 1958. On a per share basis, net earnings in the first nine months of 1959 equaled $3.24 as against $1.46 for the like 1958 period. These figures do not include a special credit of $394,000, or 24c a share in 1958, nor a special charge of $490,000, or 30c a share in 1959.

Rubbermaid

► Year ended September 30: Net income amounted to $1,122,313, equal to earnings of 86c per share of common stock, compared with $1,135,037, or 87c per share for the year of 1958. The 1959 figure is after a special charge of $250,000, equal to 19c per share. Net sales for fiscal 1959 totaled $24,507,032, compared with $21,474,805 for the 1958 fiscal year.

Carlisle Corp.

► Nine months ended September 30: Net income amounted to $996,774, equal to earnings of $1.80 per share, compared with $784,670, or $1.44 per share for the like 1958 period. The 1958 figure includes special credits of $156,611, or 29c per share. Net sales for the 1959 period totaled $16,946,892, compared with $11,007,844 for the first nine months of 1958.

National Starch

► Nine months to September 30: Net income of $2,287,894, which is equal to $1.15 per share, compared with $2,127,171, or $1.08 a share, in the same period last year. Sales in the first nine months of 1959 totaled $39,224,985 compared with $33,891,886 in the 1958 nine month period.

Armstrong Rubber

► Year ended September 30: Net income was $4,972,235, equal to $3.20 per common share, compared with $3,227,756, or $2.08 per share, for the 1958 fiscal period. Consolidated net sales for the 1959 year totaled $97,420,562, compared with $81,317,403 for the 1958 period.

Sheller Manufacturing

► Nine months ended September 30: Net income amounted to $1,009,466, equal to earnings of $1.06 per share of common stock, compared with a loss of $458,633 in the like period of 1958. Net sales in the 1959 period totaled $31,495,704, compared with $19,480,084 for the like period of 1958.

American Biltrite

► Nine months ended September 30: Net income amounted to $2,297,834, equal to $1.64 per share of common stock, compared with $1,718,289, or $1.29 per share for the same period of 1958. Net sales for the 1959 period totaled $53,135,120, compared with $43,388,680 for the like 1958 period.

A. G. Spalding

► Nine months ended July 31: Earnings for the period amounted to $813,000, or $1.05 per share of common stock, compared with $690,000, or 89c per share, for the same period last year.

Goodall Rubber

► Nine months ended September 30: Net income amounted to $367,917, compared with $267,778 for the like 1958 period. Sales totaled $9,989,758, compared with $8,027,173 for the 1958 nine-month period.

Goodrich-Gulf Plans Texas Plant

► Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has announced that it will build a new plant for the production of oriented polyolefins in Port Neches, Texas. According to the company, the new plant, to be located adjacent to the company's man-made rubber facilities at Port Neches, will first produce a type of high density polyethylene not now manufactured in the United States. Construction of the plant, which will have an estimated initial capacity of 13 million pounds annually, is underway and is scheduled for completion late in 1960. Complete sales service and development laboratory facilities will be provided.

Fire Destroys N.Y. Plant

► A five-alarm fire razed the foam rubber plant of the National Backing Corp. at 9-11 Fortieth Ave., Long Island City, Queens, N. Y., on the night of November 3. Damage was estimated at more than $175,000, but no injuries were reported. More than 100 firemen fought the flames for an hour before bringing them under control. The roof collapsed as the fire enveloped the one-story brick building, with flames rising 150 feet in the air. Thick, acrid smoke from burning rubber spread to Queensbridge Houses, an adjacent city project. The cause of the fire could not be determined. The company makes foam rubber products.

TB&C Appoints Three

► W. C. Franklin, formerly assistant sales manager for the firm, has been appointed manager of the newly organized Polychemicals Department for the Texas Butadiene & Chemical Corp., Houston, Texas. F. M. McFarland has been named manager of market development, with his first assignment in the Polychemicals Department. Before joining the firm, he was with the Food Machinery & Chemical Corp. in a market development capacity. J. C. French has joined TB&C in the Market Research Department and will be in charge of this function for the Polychemicals Department. Previously, Mr. French was with American Cyanamid Co. in its Market Research Department. The Polychemicals Department will be responsible for application research, market development, and sales of a new series of polymers, copolymers, and other types of polychemicals.

Parade Features Comic Balloons

► Mammoth comic balloon figures were featured again last year in the Macy Thanksgiving Day parade in New York City and once again helium was used to keep the balloons aloft. According to the Goodyear Tire and Rubber Co., builder of the balloons, government restrictions on the use of helium were eased last year. Comic balloons, which were completely refurbished at the Arizona Division of Goodyear Aircraft Corp., included figures that have become favorites with New York parade goers. The largest, Spaceman, was 70 feet tall and looked like a "man from Mars." Popeye, the sailor man, was 56 feet tall and made his Broadway debut in 1957. Turkey Gobbler (otherwise known as Gorgeous Gobbler) towered 50 feet high. The fourth balloon that was seen in the parade was the Observation Balloon, which was introduced in 1956.

Firestone Introduces Butyl Tire

► Firestone Tire & Rubber Co., Akron, Ohio, has announced plans for the introduction of a Firestone premium quality tire made of butyl rubber. For the past several years, Firestone tire development engineers have been experimenting with butyl rubber for tires because of some of its favorable characteristics. At Fort Stockton, Texas, a test fleet has run millions of miles on butyl rubber and has found it to have soft ride qualities and extreme cornering quietness. The tests also indicated that the new butyl tire has excellent weather checking characteristics, Firestone states. The company points out that this new tire has a premium tread depth and a tread design which makes maximum use of butyl, providing added mileage and extra traction efficiency on wet road surfaces.

Charles W. Carroll

Promoted by American Synthetic

► American Synthetic Rubber Corp., Louisville, Ky., has appointed Charles W. Carroll as its Akron district sales manager. Mr. Carroll, who has spent his entire business career in the rubber industry and related fields, joined American Synthetic earlier this year after serving as a sales representative for United Carbon Co., Inc., from 1955 to 1959. Previous to that, he served as chemical buyer for the B. F. Goodrich Co., which he joined immediately upon graduation from Ohio State University with a B. S. degree in engineering administration. Mr. Carroll is a member of many rubber industry associations, including the Division of Rubber Chemistry of the American Chemical Society, the Akron Rubber Group, Detroit Rubber Group and Plastics Group and the Southern Rubber Group.

Issues Carbon Black Booklet

► United Carbon Co., Inc., has prepared a new 6 page folder on carbon black-rubber masterbatches, which reviews, in laymen's terms, the first commercial production of carbon black-styrene butadiene rubber masterbatches; outlines typical applications; and points up the essential results derived by the consumer and the rubber fabricator. It also includes a simple manufacturing process flowchart and a short technical explanation of the masterbatch process. Entitled "The Mixing Magic Born at Baytown," the booklet is available by writing to Public Relations Division, United Carbon Co., Inc., 410 Park Avenue, New York 22, N. Y.

Pricher Elected a Vice-President

► New Jersey Zinc Co., New York, N. Y., has elected Lawrence S. Pricher as a vice-president of the company. His duties with New Jersey Zinc will involve principally matters pertaining to finance. Mr. Pricher was formerly vice-president, finance, of the Foster-Wheeler Corp.

DuPont to Produce Lycra

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced plans for the commercial production of an elastic textile fiber called Lycra. A plant will be constructed at Waynesboro, Va., where DuPont now produces Acele acetate yarn and Orlon acrylic fiber. The initial installation is scheduled for completion by the third quarter of 1960. The company is said to have spent $10,000,000 developing the fiber, called Fiber K, during its trade evaluation.

Produced from a polymethane base, Lycra weighs a third less than conventional elastic thread, the company states. The new fiber is said to wear longer; to have two to three times more restraining power; to permit washing and drying in automatic washers; and to be resistant to perspiration and cosmetic oils. Spokesmen for the firm expect early production to be utilized in foundation garments.

Firestone Plans Stock Split

► Firestone Tire and Rubber Co., Akron, Ohio, has proposed a three-for-one split of its common stock and an increase in the quarterly dividend to 75c on present shares, according to an announcement by Harvey S. Firestone, Jr., chairman. Stockholders will vote at the annual meeting on January 16 on the split and on increasing the authorized common shares to 36,000,000 of no par value from 12,000,000 of $6.25 par value. There are 8,794,032 shares outstanding. The 75c quarterly dividend, which is payable on January 20, compares with 65c a share paid quarterly since 1956. The dividend declared is equivalent to a quarterly rate of 25c a share on the split shares. The board also recommended a new stock option plan similar to the one adopted in 1951, which expired in July 1958. Present directors will not be eligible for participation in the plan, the company said.

Copolymer Names Carpenter

► Copolymer Rubber & Chemical Corp., Baton Rouge, La., has announced the promotion of Dr. Paul G. Carpenter, previously acting general manager, to the position of executive vice-president and general manager. Dr. Carpenter succeeds Thomas B. Crowell, who died on November 2, 1959. Dr. Carpenter holds an A.B. degree in chemistry from Willamette University and an M.S. degree in physical chemistry from Oregon State University. He received his Ph.D. from the University of Wisconsin in 1941. Dr. Carpenter joined Copolymer in December 1956, as director of research and development. He is a member of the American Chemical Society and the Society of Petroleum Engineers.

Fred Meendsen

Appointed by Velsicol Chemical

► Velsicol Chemical Corp., Chicago, Ill., has announced the appointment of Fred Meendsen as a technical sales representative for its industrial chemicals. The company states that Mr. Meendsen will handle the territory of Tennessee, Arkansas, Mississippi, Louisiana and Alabama. Mr. Meendsen is a graduate of Colgate University, and holds a master's degree from the Harvard School of Business Administration. Prior to joining Velsicol Chemical in 1957, handling special staff assignments, Mr. Meendsen was with Dow Chemical Co. He will have his headquarters at the company's plant in Memphis, Tenn.

Dominion Rubber Promotion

► Naugatuck Chemicals Division of the Dominion Rubber Co., Ltd., Montreal, Que., Canada, has announced the appointment of Douglas G. Rodenburg to head technical service on rubber chemicals. Mr. Rodenburg is a graduate of the Ontario Agricultural College with the degree of B. S. A. in chemistry. He served in the Product Control and Development Department of the Tire Division of Dominion Rubber prior to joining the Naugatuck Development Department in 1958. He is an active member of both the Chemical Institute of Canada and the Ontario Rubber Group.

Issues Natural Rubber Booklet

► Natural Rubber Bureau, 1631 K St., N.W., Washington, D. C., has released a booklet consisting of six papers on natural rubber, which were delivered at the International Rubber Conference last November. The papers reflect a portion of the research conducted on natural rubber and were prepared by scientists connected with the Rubber Research Institute of Malaya and the British Rubber Producers' Research Association, both of which laboratories are financed by the Malayan Rubber Fund.

Silicone Rubber Tapes Discussed At Electrical Insulation Meeting

► The Second Annual National Conference on the Application of Electrical Insulation, held recently at the Shoreham Hotel in Washington, D. C., featured several papers of interest to the rubber industry. The conference, sponsored by the National Electrical Manufacturers Association and the American Institute of Electrical Engineers, featured eighteen technical sessions, one of which was devoted to the topic of silicone rubbers in electrical insulation applications.

The first paper, "Application of Silicone Rubber in High Voltage Electrical Rotating Equipment", was presented by George R. Betzhold (Allis-Chalmers). According to the speaker, the use of silicone rubber as the primary ground wall insulation on various parts of electrical rotating equipment has been the basis for a complete new concept of insulation values. Mr. Betzhold evaluated the material, discussing some of its properties, uses, problems and development. He said there is a wide choice of basic materials and component parts, which permits tailoring of products to fit any and all applications.

Use Benefits Listed

Use benefits of silicone rubber insulated electrical equipment listed, were excellent dielectric characteristics, resistance to abnormal environmental conditions, flexibility in applications to special physical configurations, excellent heat stability, good resistance to most chemical contaminants and the promise of a reduction in maintenance time and costs.

H. Wilfred Lynch (Moxness Products), who presented "Considerations in the Production of Silicone Rubber Insulation for Form Wound Coils", said the ideal silicone rubber insulation tape produces a sealed jacket of insulation over the conductor to which it is applied. Mechanical reinforcement of the silicone rubber, he said, reduces the ability of the tape to conform and increases the occurance of wrinkles, which may contribute to early breakdown. For this reason initial decision was made to produce unsupported silicone rubber tape as the primary insulation for form wound coils. Mr. Lynch discussed methods which may be used to produce flat unsupported silicone rubber tape, including calendering between rolls and extrusion through a die. Describing both methods in detail, he then related the results of tests made on silicone rubber tapes.

The third speaker, Donald M. Bartos (Dow Corning), discussed "Evaluating Voltage Endurance of Silicone Rubber Insulation Systems". In this paper, the speaker described laboratory tests which indicate that silicone rubber insulation systems have adequate voltage endurance for use in high voltage equipment. He said that investigations show that within the operating temperature range contemplated for silicone rubber insulated equipment, voltage endurance properties are excellent. Hundreds of applications have shown that voltage endurance or corona degradation are not limitations of silicone rubber in high voltage equipment. Continuing laboratory tests and accumulating field experience will substantially add to available data confirming these conclusions, he stated.

"Bondable Silicone Rubber Tapes with Improved Electrical and Physical Properties", was prepared by R. A. Ward and J. W. Wetzel (General Electric). Silicone rubber tapes have been developed which have eliminated the shortcomings of earlier materials, the authors said. Dielectric properties are now being obtained in supported tapes which are approaching the excellent dielectric character of unsupported silicone rubber. Processing advantages and lower applied insulation costs are being achieved through improved insulating tape design. Extensibility in the fabric of supported tapes has made possible void-free insulation structures capable of operating over a wider temperature range under high mechanical stresses. Other new developments were also cited.

The last paper, entitled "Developments in Silicone Rubber for Applications in Insulation Systems", was presented by J. E. Rogers (Union Carbide). The paper described some of the properties of two silicone rubber compounds used in the fabrication of an insulation system for large rotating machines. The first, Union Carbide K1608R, is used in the form of fusible unsupported tape for the primary insulation and the second, Union Carbide K-1014RS, is used as a bonding aid and a sealer in these insulation systems. The speaker described a typical form-wound coil insulation system employing these newly developed fusible tapes and a silicone rubber dispersion. He felt that the development of fusible silicone rubber and these special silicone rubber dispersions has opened the door to increasing use of these materials as insulation for form-wound coils of large rotating machines.

Other papers of interest were "Progress in Silicone Insulation," by J. S. Hurley, Jr. (General Electric); "A New Fast Curing Silicone Varnish," by R. E. Kincaid (Dow Corning); "A New Low Temperature Silicone Impregnating Varnish," by J. B. Toogood (Union Carbide); and "New Technology in Low Temperature Curing Silicone Resins," by A. E. Horning (General Electric).

Bishop Discusses Polyisoprene At Chicago Group Meeting

► The Chicago Rubber Group held a technical meeting on November 6 at the Furniture Club in Chicago, Ill., with 185 members in attendance. Guest speaker at the meeting was E. T. Bishop (Shell Chemical), who discussed "Polyisoprene." During his talk, Mr. Bishop displayed various molded items made from Polyisoprene rubber. A question-and-answer period followed the talk.

Mr. Bishop stated that Shell isoprene rubber is the first commercial scale production of "synthetic natural" rubber of the *cis* 1,4-polyisoprene or Hevea type. He explained that the unique properties of this product are of the uniformity inherent in synthetically produced material and very light color. Total non-rubber hydrocarbon content is somewhat less than with Hevea or styrene-butadiene, he remarked. Mr. Bishop stated that Shell isoprene rubber can be processed in a manner similar to natural rubber, but does not require as drastic a preplastication. He explained that optimum procedures vary somewhat with the type of stock being made and the equipment being used.

He pointed out that the properties of compounded stocks approach those of natural rubber. In tread stock, he explained, the tensile strength and modulus are somewhat lower, the hardness, tear resistance (212°F.) heat build-up, and resilience are essentially equal, and the permanent set is superior. Mr. Bishop told the group that Shell isoprene rubber is being evaluated in a broad range of applications including tires, camelback, footwear, adhesives, intricate molded goods, and pharmaceutical applications.

Form European Concern

► Neville Chemical Co., Pittsburgh, Penna., and Teerunie N. V., Uithoorn, Holland, have established a jointly-owned company to manufacture and market hydrocarbon resins and solvents for European markets. The new company, Neville Cindu Chemie N. V., will provide customers with a new and more complete source of hydrocarbon resins and solvents, as well as the combined knowhow and research facilities of the two parent companies. Officers of both firms feel that the production facilities of the new company will more readily meet the growing demand for a complete range of hydrocarbon resins manufactured in Europe. Construction of a new plant has been under way for several months at Uithoorn near Amsterdam and completion is expected in the late winter of 1960. Until operations begin, Neville Cindu Chemie will market Neville products in Europe and will also handle the sale of Teerunie's current production of coumarone-indene resins, the company states.

Richard P. Tarbox

Named to Chemical Sales Post

► Plastics and Coal Chemicals Division of the Allied Chemical Corp., New York, N. Y., has announced the appointment of Richard P. Tarbox to the post of assistant sales manager for chemical sales. He will be primarily responsible for sales of tar acids, tar bases and phenols, synthetic and natural. Mr. Tarbox has held various positions in the sales as well as research and development areas of the chemical industry since his graduation from Pennsylvania State University, where he received his B.S. degree in chemical engineering in 1948. He is a member of the North Jersey Section of the American Chemical Society and Alpha Chi Sigma fraternity.

Monsanto Expands Facilities

► Monsanto Chemical Co., Springfield, Mass., plans to increase production of styrene monomer by at least 200 million pounds a year. The first stages of new facilities for the production of this material will be located in Texas and are expected to be in operation by the first quarter of 1961. The new facilities are based on advanced technology and process automation developed by the Monsanto research and engineering staff. The additional capacity is expected to help supply the increasing demand for styrene monomer by the synthetic rubber and other consuming industries, as well as the accelerating needs of the company's styrene plastics operations.

United Ultramarine Names Agent

► United Ultramarine & Chemical Co., New York, N. Y., has appointed Harry A. Baumstark & Co., 6801 Arsenal St., St. Louis, Mo., as sales representative. The territory of the new representative includes eastern Missouri, northern Arkansas, southern Illinois including Peoria, and southeastern Iowa including Burlington and Fort Madison. The complete line of Ultramarine pigments will be represented, including reds, violets, greens and blues.

Southern Ohio Elects Officers

► The results of the election of 1960 officers and directors were announced during the 13th Annual Christmas Party of the Southern Ohio Rubber Group, which was held on December 12 at the Miami Valley Country Club in Dayton, Ohio. The party, which consisted of a dinner and dance, was attended by 296 members and guests. Prizes, purchased with funds contributed by suppliers, were awarded to 95 lucky ticket holders. Each lady present received a gift compact. Dance music was furnished by the Little Combo.

The newly-elected group officers are: *Chairman,* Frederick W. Gage (Dayton Chemical Prod.); *Chairman-Elect,* Howard G. Gillette (Precision Rubber); *Treasurer,* Roger E. Headrick (Wright Patterson AFB); *Secretary,* Richard C. Hempelman (Premier Rubber); *Directors,* three-year term: Ray Jacobs (Premier Rubber), Marvin Coulter (American Zinc Sales), Jack West (Union Carbide Chemicals); two-year term: H. S. Karch (C. P. Hall), William Herberg (Dow Corning), J. M. Williams (Amsco Chemicals); one-year term: Frank Bell (Goodrich Chemical), William Nolan (Inland Mfg.), and Reuben Wolk (Dayton Rubber).

Develops Hi-Vi PVC Foam

► Highside Foam Products, Inc., Clifton, N. J., has announced the development of a new, heat sealable, open cell polyvinyl chloride foam. Called Hi-Vi, the new PVC foam is reported to have a low density and is deep cushioning. According to the company, it is the only vinyl foam being produced by a continuous chemically blown process. The foam is available in continuous lengths, up to 48 inches wide and is produced in thicknesses as small as ⅛ inch, the company states. Hi-Vi can be readily laminated to cloth, and because it can be compressed and heat sealed, is especially well adapted for use in quilted products, shaped cushions and similar merchandise, the company claims. According to Highside, the foam is not subject to aging deterioration, and offers resistance, varying from good to excellent, to acids, alkalies, grease and oils, high humidity, sunlight, water and air.

CRMA Meeting Planned

► "Consumer Market Research—as an Aid to Chemical Market Research" will be the theme of the Chemical Market Research Association meeting, to be held at the Lord Baltimore Hotel in Baltimore, Md., on February 17 and 18, 1960. Speakers will discuss why and how consumer market research is of increasing importance to the chemical industry; how this tool may be used effectively; and will also give an appraisal of its merits.

Maurice W. Richardson

Appointed Sales Engineer

► Farrel-Birmingham Co., Inc., Ansonia, Conn., has announced the appointment of Maurice W. Richardson, Jr., as sales engineer. Mr. Richardson has been assigned to the Akron, Ohio, territory and will work out of the company's office at 665 West Market Street in Akron. Mr. Richardson has a background of considerable experience in the rubber industry, including four years with B. F. Goodrich Co., the company states.

Winter Tire Fits Small Cars

► A new compact winter tire for the 1960 line of smaller automobiles has been announced by The General Tire & Rubber Co., Akron, Ohio. The 13-inch tubeless winter tire, a fatter, shorter and lighter version of the company's regular Silent Safety Winter Cleat line, has been designed to take the smaller cars everywhere their heavier counterparts can go. It can be used for either high-speed turnpike operation on dry pavement or for operation under heavy snow-slush conditions.

No winter retreads will be sold for the new compacts because no worn 13-inch casings will be available for recapping. The new winter tire utilizes a continuous tread design for long, quiet, easy-riding performance, coupled with deep, angled, siped cleats for traction through snow and mud and over wet or icy streets, according to the company. The tire body is constructed of General's Nygen cord.

Raises Price of Latex Foam

► Dayton Rubber Co., Dayton, Ohio, has announced a 10 per cent price increase on all latex foam products made by its Koolfoam Division. In November 1959, the company had increased prices 5 per cent on the same products. According to Dayton, similar increases in the price of urethane foam might be expected in the near future.

Harchem Appoints Five

► Harchem Division of Wallace & Tiernan Inc., Belleville, N. J., has announced that five additions have been made to its staff including William C. Wiley, who has been appointed product development manager. Mr. Wiley has had 18 years of experience in research and product development in the field of polymers and chemicals, having served with such companies as General Tire, Borden, Reichhold and Nopco. William G. Paul has joined Harchem as a representative for fatty acids in the Illinois, Missouri and Wisconsin area. A graduate of Northwestern University, Mr. Paul was formerly associated with Victor Chemical Works, E. F. Drew & Co. and Van Ameringen-Haebler.

C. John Ebbrecht has been appointed representative for fatty acids in the New England and New York State area. He is a graduate of Calvin College, Grand Rapids, Mich. Wallace E. Riffelmacher has been appointed sales representative for chemicals and plasticizers in the New York and New England area. A graduate of Colgate with an M.S. from Pennsylvania State, Mr. Riffelmacher is a member of the American Chemical Society. He was formerly with the Research Administration of the U. S. Army, and also served as a sales representative for DuPont. Raymond C. Wolfert will serve as sales representative for Harchem plasticizers in the Midwest. Mr. Wolfert, a graduate of Muhlenberg College, was formerly associated with McKesson & Robbins, Inc.

Granted License for Antidust

► National Polychemicals, Inc., Wilmington, Mass., is now manufacturing Antidust, a product of Rhein-Chemie, G. m. b. H., Mannheim, Germany, in the United States. Antidust, a detackifier for rubber, had previously been imported from Germany in limited quantities. Because of heavy demand, the company states, commercial quantities will be manufactured here and sold to the American rubber and plastics industries by National Polychemicals under an exclusive licensing agreement with Rhein Chemie.

Used extensively throughout the European rubber industry, Antidust is employed as a dip or spray solution and coats uncured rubber stocks with a very thin, yet stable film which prevents adhesion. It raises no dust or fumes, furthering plant cleanliness, according to the company. Besides acting as a detackifier for sheeted, calendered or extruded rubber stocks, Antidust can also be used as a replacement for liners in storing rolls of uncured stocks and as a silicone-free mold release. A technical bulletin on the product and its use is available from National Polychemicals.

DuPont Aids Education

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has awarded grants totaling almost $1,200,000 to 139 universities and colleges in its annual program of aid to education. The entire program is for fundamental research by universities and for strengthening the teaching of science and related liberal arts in the 1959-60 academic year. This year's grants are nearly doubled with $450,000 to be devoted to unrestricted research in the physical sciences. These funds may be used for fundamental research in any way the institutions wish and they are free to publish the results. For this work, the company gave grants ranging from $5000 to $20,000 for fundamental research in chemistry, chemical engineering, physics, mechanical engineering and metallurgy.

An additional $27,000 was awarded for 18 summer research grants of $1500 each. The purpose is to enable individual staff members of the universities to undertake research of their own choosing in chemistry and engineering during the summer. The largest part of the program is to help strengthen the education of scientists and engineers. To this end, grants totaling $696,000 were awarded to more than 100 colleges and universities to support the teaching of science and mathematics as well as other subjects.

Transferred to Italian Office

► R. B. Robitaille, who has been manager of the Phillips Chemical Co. eastern district rubber chemicals sales at Providence, R. I., is transferring to Milan, Italy, as managing director of Phillips Carbon Black Italiano. C. M. Wilson has been promoted to succeed Mr. Robitaille at Providence. Mr. Robitaille started with Phillips in 1944 and has been located at Providence as eastern district representative for the Phillips Rubber Chemicals Sales Division since 1952. Mr. Wilson, who started with the company in 1948, has been technical sales representative for the Rubber Chemicals Sales Division in Akron since 1956.

Phillips Carbon Black Italiano, which is jointly owned by Phillips Petroleum Co. and ANIC S.p.A., will build a plant at Milan having an initial design capacity of 25,000,000 pounds per year of oil blacks. It is scheduled to be in operation within two years. The plant will use the basic Phillips oil furnace black process which was pioneered by Phillips.

Cyanamid Appoints Two

► Organic Chemicals Division of the American Cyanamid Co., New York, N. Y., has appointed T. F. Cooke as director of the Chemical Research Department and Robert S. Long as commercial development manager. Dr. Cooke joined Cyanamid in 1940 as a research chemist and during World War II served for three years as an officer with the U. S. Army. Since 1945, he has served the company in numerous research and technical service managerial positions. He is a fellow of the American Institute of Chemists and a member of the American Chemical Society and the American Association of Textile Chemists and Colorists. Dr. Cooke holds thirty patents and has numerous publications in the fields of textile chemicals, dyes and pigments.

Dr. Long, who joined Cyanamid in 1940 as a research chemist, has served as director of product research for the Organic Chemicals Division at its Bound Brook, N. J., laboratories since 1956. He is a member of the American Institute of Chemists, the American Chemical Society, the American Association for the Advancement of Science, the American Association of Textile Chemists and Colorists and the Society of Dyers and Colorists. He holds 35 patents in fields pertaining to dyes and dyes technology and has been the author of many articles in leading research and technical journals.

Plans Production Increase

► Plans for large-scale production of a chemical that minimizes cracking in tire sidewalls and treads, have been announced by the Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn. The chemical, Flexzone 3-C, will be manufactured at the division's main plant in Naugatuck. Construction of a new unit to produce the chemical at the Connecticut plant site will be started in December and the unit is expected to be completed by the fall of 1960 with operations scheduled to begin before year's end.

Flexzone 3-C, now being produced in limited quantities by Naugatuck Chemical, is described as an antiozonant-antioxidant by chemists. Chemically, it is N-isopropyl-N'-phenyl-p-phenylene diamine. It combats the effect of the air's ozone and oxygen on tires. According to Naugatuck Chemical, extensive laboratory and road tests demonstrated that this new tire chemical can increase the tread cracking resistance of truck tires more than four times and hold sidewall cracking in passenger car tires down to a point where damage is negligible.

► Expanded Polystyrene Manufacturers Task Force, New York, N. Y., has available copies of its report on a new specification for expanded polystyrene for thermal insulation.

George R. Lawson

Promoted by Pennsalt

► Pennsalt Chemical Corp., Philadelphia, Penna., has appointed George R. Lawson, formerly director of marketing for its Industrial Chemicals Division, as general manager of the Chemical Specialties Division. Mr. Lawson succeeds Albert H. Clem, who has been named to the newly created post of vice-president of marketing. Mr. Lawson received a B.A. degree in chemistry from Yale University in 1927. Prior to joining Pennsalt in 1946 as a sales representative of the Sharples Chemicals operation, Mr. Lawson was engaged in research and technical service for the Hood Rubber Co., and the Barrett Division of Allied Chemical Corp. Prior to the merger of the Sharples Division and the Industrial Chemicals Division, Mr. Lawson was in charge of sales of the Sharples Division. With the merger in 1956, he was named to his most recent post.

Mr. Clem holds a degree in chemical engineering from Pennsylvania State University. He joined Pennsalt in 1938 as a chemist, and in 1939 became a sales service representative. He has since held positions as manager of sales, assistant to the vice-president in charge of sales, assistant general sales manager, and general sales manager of both the Industrial Chemicals and Chemical Specialties Divisions.

Adopts New Insignia

► Marine Magnesium Division of Merck & Co., Inc., Rahway, N. J., plans to adopt a distinctive emblem with stylized white sails on a marine blue background. The division formerly used the Merck cross and the illustration of a smaller, square-rigged sailing ship. The up-dated design will be used on technical service sheets showing white sails on a blue background. On letterheads, Marine Magnesium will reverse the colors, using blue sails on a white background. Labels will carry an enlarged illustration of the ship, and product name and description will be imprinted in the white sail areas.

Goodrich Plans Texas Track

► B. F. Goodrich Co., Akron, Ohio, has announced plans to build what is expected to be the world's longest test track near Pecos in western Texas. The new facility will be used for testing tires at higher than legal speeds. Now being planned by Goodrich engineers, the track will be a circle nine miles around. According to Goodrich, the track will be 24 feet wide and will be banked so test vehicles can maintain extremely fast speeds. It will accommodate more than 50 cars and trucks at one time and can be used at speeds up to 150 miles an hour.

The purpose of the track is to give tire design engineers "better tire information quicker and to permit the evaluation of new tire designs under the most severe operating conditions of speed and load", a spokesman for the company states. For years, Goodrich has tested the endurance of its tires on laboratory test wheels and on vehicles operating on public roads. These testing methods will continue to be used along with the new tracks. Goodrich recently constructed the "shortest" track at its Research Center in Brecksville, which is used for studying ride quality, steering, skid resistance and tire noise.

U.S. Rubber Promotes Hugger

► Richard H. Hugger has been appointed senior department manager at the U. S. Rubber Co. Research Center in Wayne, N. J. Since 1947, when he first joined the company, Mr. Hugger has worked in the Mechanical Engineering Research Department, rising to the position of department manager in 1958. As senior department manager, he will have increased responsibility for the direction of the technical activities of this department. His experience has included work on rubber and plastic footwear processes, industrial rubber goods, textile processing machinery, equipment for polyurethane foam processing, sprayed metal molds and heat transfer apparatus. Mr. Hugger received a B.S. degree in mechanical engineering at Stevens Institute of Technology in 1924. Before his affiliation with U. S. Rubber, he was chief engineer with the Clover Manufacturing Co. and later general manager of the Cordo Chemical Co.

Cope Named ACS President-Elect

► The American Chemical Society has announced that Prof. Arthur C. Cope has been selected as its president-elect. Prof. Cope is head of the Chemistry Department at Massachusetts Institute of Technology, and a well-known organic chemist. He will head the 88,000-member society in 1961. The president for 1960 is Dr. Albert L. Elder, director of research of the Corn Products Co., Argo, Ill.

Frank S. Bosley

Named Executive Vice-President

► Frank S. Bosley, vice-president in charge of manufacturing and engineering for the Gates Rubber Co., Denver, Colo., has been named executive vice-president in charge of manufacturing. Mr. Bosley becomes the firm's second executive vice-president, the first being Charles C. Gates, Jr. In his new post, Mr. Bosley will coordinate the manufacturing operations of all seven Gates plants including Denver; Nashville, Tenn.; Toluca, Mexico; Brantford, Ontario, Canada; Sioux City, Iowa; Guntersville, Ala.; and Chicago, Ill.

Mr. Bosley joined Gates in 1928 and started work in the Tire Development Section of the Research Department. In 1929, he was moved into the Tire Division where he soon became head of that department. He was named factory superintendent in 1934. In 1946, he was named to the board of management and in 1946 became vice-president in charge of manufacturing. Later his responsibilities were enlarged to include the Engineering Division, as well as manufacturing.

Barrett Names Sales Director

► Barrett Division of Allied Chemical Corp., New York, N. Y., has announced the appointment of Wesley E. Gatewood as director of field sales. A 1947 graduate of the University of Portland, Ore., Mr. Gatewood joined Barrett in February as director of sales training and promotion. He had been with the Armstrong Cork Co. for 12 years, last occupying a post as assistant sales manager for the Philadelphia District.

N. Y. Group Holds Xmas Party

► The New York Rubber Group held its annual Christmas Party on December 18, at the Henry Hudson Hotel in New York City. The party was attended by 460 members, and 120 prizes were awarded to lucky ticket holders. The evening consisted of cocktails, dinner, and music and entertainment by Charles Stuart Enterprises.

ASME to Hold Rubber Conference

► The Erie Section of the American Society of Mechanical Engineers, in cooperation with the National Rubber and Plastics Professional Division of ASME, has announced that it is sponsoring a Rubber and Plastics Conference on October 9, 10 and 11, 1960, at the Hotel Lawrence in Erie, Penna. Technical papers covering the following four basic subject classifications will be included in the program: (1) Vibration and Shock Control; (2) Bonding of Engineering Structures; (3) Non-Rigid Structures; and (4) Automation of Rubber and Plastics Processing. A highlight of the three-day program will be a luncheon on October 11, at which Dr. Turner Alfrey (Dow Chemical) will be the guest speaker. According to the Erie Section, an industrial exhibit is being planned to run concurrently with the technical program.

The Erie Section also announced that the following committee chairmen have been appointed: *General Chairman*, G. H. Billman (Lord Mfg.); *Exhibits*, D. J. Beecher (American Sterilizer); *Hospitality*, S. B. Campbell (Lord Mfg.); *Plant Tour*, M. D. Gunselman (General Electric); *Publicity*, R. M. Whiting (Skinner Engine); *Tuesday Luncheon*, A. G. Gifford (Lord Mfg.); and *Social Affairs*, J. R. Schrecongost (General Electric).

Retires from National-Standard

► K. D. Smith has retired from active employment with National-Standard Co., Niles, Mich., after 35 years of association with the rubber industry. He had been vice-president of Rubber and Automotive Relations and will continue to serve in an advisory capacity. During his career, Mr. Smith was employed by the Miller Rubber Co.; the Syracuse Rubber Co.; the Firstone Tire & Rubber Co.; and the B. F. Goodrich Co. He has been associated with National-Standard for the past 15 years. A pioneer in rubber chemistry, Mr. Smith became well known as a tire construction engineer and wrote a number of papers on tire materials. He was instrumental in the development of low pressure tires. During World War II, he served in the U. S. Army Ordnance Department and was assigned to the development of synthetic tires.

Auburn Appointments

► Martin B. Weiner and John L. Urgo have been appointed vice-presidents of the Auburn Manufacturing Co., Middletown, Conn. Mr. Weiner, who has been with the company since 1939, is the director of marketing and procurement. Mr. Urgo, who has been associated with the company for the past 28 years, currently directs product planning.

Richard P. Houlihan

Named President of Gavitt Wire

► Richard P. Houlihan has been appointed president of the Gavitt Wire and Cable Co., Brookfield, Mass., succeeding Budd E. Pollak, who died recently. Mr. Houlihan graduated from Worcester Polytechnic Institute as an electrical engineer. In 1936, he joined Gavitt Manufacturing Co., Inc., a predecessor of Gavitt Wire and Cable. In 1954, he was named general manager and in 1957, he became vice-president. During World War II, he held the rank of lieutenant colonel in the U. S. Marine Corps, serving in the Pacific and in Washington.

Esso Names Two Executives

► Esso Standard Oil Co., New York, N. Y., has announced the election of O. V. Tracy as president of the company. He succeeds William Naden, who has become an executive vice-president and director of the new Humble Oil and Refining Co. The company also announced that Robert H. Scholl, formerly a vice-president, has been named executive vice-president, succeeding E. Duer Reeves, now a vice-president and director of Humble. Mr. Tracy graduated from the United States Naval Academy in 1924. He joined Esso Standard in 1930 and served as general manager of the Chemical Products Department. In 1952, he became president of Enjay Co., and was named a director of Esso Standard in 1954 and vice-president in 1956. Mr. Tracy is a former director of the Manufacturing Chemists' Association and a member of the American Chemical Society.

Mr. Scholl is a graduate of Princeton University and Columbia University Law School. He joined Esso Standard as a member of its Law Department in 1937, was named associate general counsel in 1946, and general counsel in 1949. In 1954, he was elected a vice-president and director of the company. Mr. Scholl is a former national chairman of the American Petroleum Industries Committee of the American Petroleum Institute.

Increases Cis-4 Production

► Phillips Chemical Co., Bartlesville, Okla., will increase production of its new *Cis*-4 polybutadiene rubber to a rate of 20,000 long tons a year. Necessary enlargement of the Borger, Texas, synthetic rubber plant is expected to be completed by August 1960. Butadiene to make *Cis*-4 is supplied by the company's adjacent butadiene plant. *Cis*-4, a product of Phillip's research is said to have outperformed natural rubber in truck and passenger car tire tests over millions of miles during the past three years. This performance, the company states, has been confirmed by extensive tests carried out by several tire manufacturers.

Extensive use of both truck and passenger car tires, Phillips reports, has demonstrated the high resilience, low heat build-up, high resistance to abrasion, aging and blowout, and exceptionally long wear, of tread made from *Cis*-4 and *Cis*-4 mixed with natural rubber. Traction of these tires on ice and snow is said to be superior to conventional cold rubber treads. *Cis*-4 processes readily under standard factory conditions when mixed with as little as 25 per cent of natural rubber.

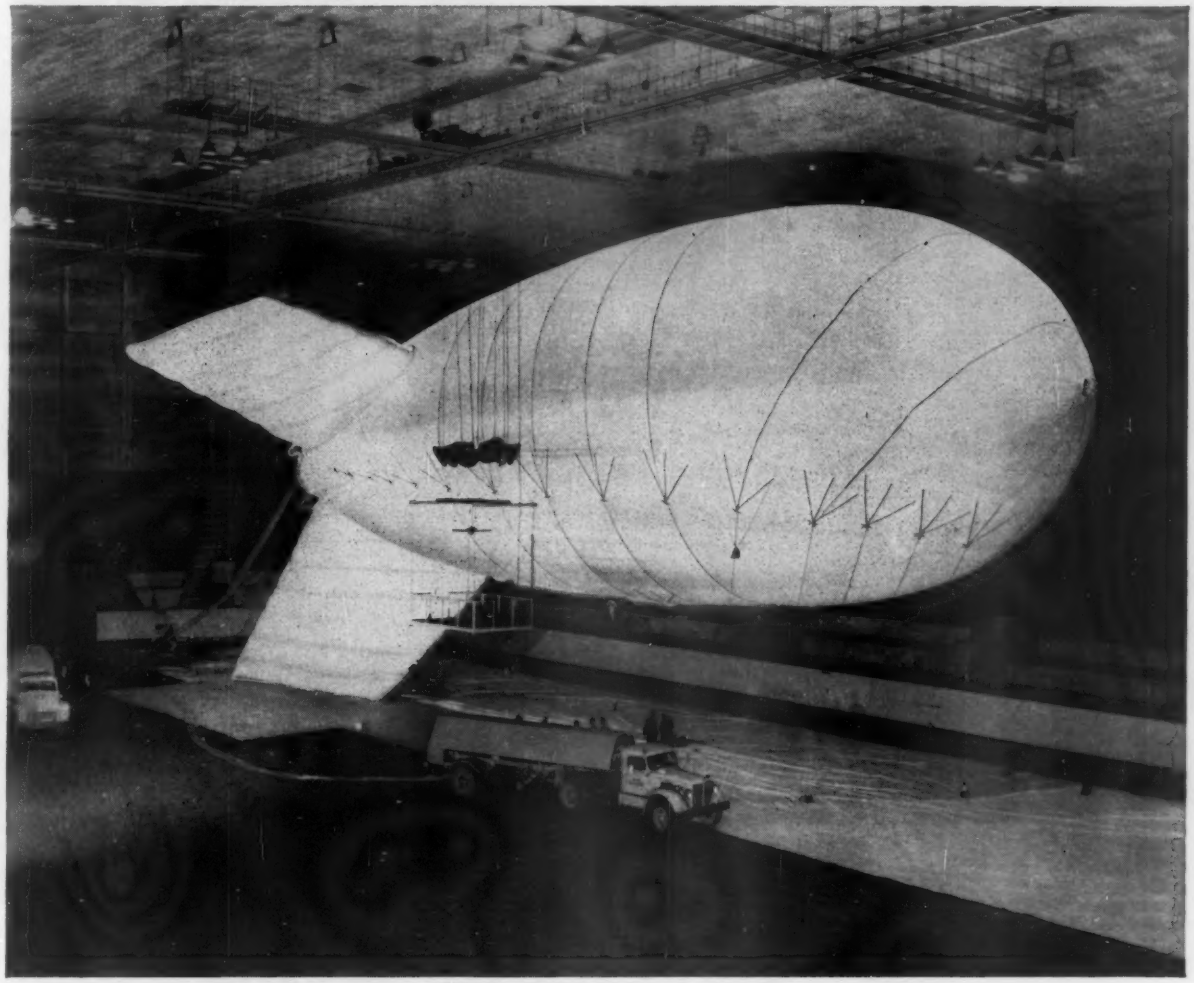
New Credit Union Formed

► Employees of the Union Asbestos & Rubber Co., Blue Island, Ill., recently formed their own credit union, according to the Credit Union National Association (CUNA). There are 120 credit unions serving employees in the rubber industry, CUNA reports. Credit unions are financial self-help groups whose members save their money together and make loans to each other at low cost. The credit union is chartered by the State of Illinois and deals only with its members, who must share the common bond of association under which the credit union was organized. Regular dividends are paid on savings, and many credit unions also return to borrowers a percentage of the interest collected, thereby reducing the cost of credit union loans even more. Some 26,000 credit unions serve more than 13,000,000 members, CUNA reports.

Miller Named Sales Manager

► Leo Miller has been appointed southern regional industrial sales manager for Dayton Industrial Products Co., Melrose Park, Ill., a division of the Dayton Rubber Co. Mr. Miller will work out of the company's new Atlanta warehouse handling sales in southeastern United States of the Dayton line of industrial V and cog belts, hose, poly-V drives, rubber and rubber-to-metal and molded products. He joined Dayton in 1955 as a district sales manager and prior to his new appointment had been assigned to Cincinnati, Ohio, and Bakersfield, Calif.

Fabric takes to the air in giant Aerocap Balloon



Recently developed by the Mechanical Division of General Mills, a huge balloon made of impregnated fabric now provides a practical means for establishing captive aerial platforms for scientific equipment. Designed for stability and durability under adverse weather conditions, these amazing Aerocaps—the largest of which can lift up to 15,000 pounds—have been used in atomic weapons testing and in elevating radar antennas, acoustical measuring devices and other scientific instrumentation.

The fabric that meets the rugged requirements of this revolutionary development is Wellington Sears nylon, one of many base fabrics engineered for specific jobs of all kinds . . . for laminating, coating and rubberizing.

Wellington Sears has been supplying fabrics to industry for more than a century. Why not take advantage of this experience for help in your own fabric applications. Write today for your copy of a free illustrated booklet, "Fabrics Plus." Address Dept. G-1.

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Canadian News

► British manufacturers and exporters have disputed a claim by the Canadian rubber industry that it has lost export markets for rubber belts because of United Kingdom competition. D. Gordon Blair of Ottawa, counsel for the Federation of British Rubber and Allied Manufacturers, recently suggested to the Canadian Tariff Board that any drop in exports was due to the refusal of British and American parent companies to direct export business to Canadian subsidiaries. The Rubber Association of Canada has asked the board for increased protection against low-cost imports of rubber belts and belting from the United States, Britain, Japan, West Germany and Sweden. It proposes that the British preferential tariff be boosted to 20 per cent from 7½ per cent and that the most-favored-nation rate be raised to 30 per cent from 20. Mr. Blair said all but one of the companies represented by the association have British or United States parent companies.

► The Lachine, Quebec, plant of the British Rubber Co. recently disclosed that about 600 workers were laid off at the end of the year. In a letter to employees, the company, which manufactures rubber footwear, tires and other molded products, said that difficulties in selling its products forced the move. It said exports to Great Britain, Belgium, South Africa and the West Indies have dwindled because of currency restrictions. The Lachine plant has not operated at full production levels for some time, the company noted. An agreement has been reached to share footwear production with the Miner Rubber Co. of Granby, Quebec, the company said.

► J. A. Pym has been appointed Plastic Section manager in the Development Department of the Naugatuck Chemicals Division of the Dominion Rubber Co., Ltd. Mr. Pym, previously a group leader in the Plastics Section, will now be responsible for customer technical service and for the development of new Vibrin polyester resin types and formulations and new Vibramix compounds. A graduate of the University of Western Ontario, Mr. Pym was previously employed by Merck & Co., Ltd. and Cyanamid of Canada, Ltd. He joined the Naugatuck organization in the Development Department in 1956. Mr. Pym will continue to make his headquarters at the Naugatuck Laboratories in Elmira, Ontario.

Named Senior Research Scientist

► Dr. Henry E. Haxo has been appointed a senior research scientist at the Research Center of the U. S. Rubber Co., Wayne, N. J. Dr. Haxo, a member of the Elastomer Research Department, is engaged in research on oil resistant rubber and the use of non-black fillers in the reinforcement of rubber. He has been active in research on various types of plastics and rubber for Arctic service. A graduate of the University of North Dakota in 1938, Dr. Haxo obtained his Ph.D. degree in physical chemistry at Yale University in 1941. He joined U. S. Rubber in 1941 and served in the Army from 1942 to 1946. Most of his duty was with the headquarters of the Army Service Forces and the Army-Navy Munitions Board, where he worked on military problems relating to rubber and chemicals. In 1951, Dr. Haxo served as a civilian consultant to the Munitions Board on rubber. He holds the rank of lieutenant colonel in the U. S. Army Reserve.

Constructs New Building

► R. C. Musson Rubber Co. has constructed a new, modern building for its factory and main office at 1320 Archwood Avenue, Akron 6, Ohio. The new facility, which provides nearly 20,000 square feet of floor space, incorporates all the latest ideas and equipment for fast, efficient operation. Everything is designed for smooth flowing production and service. Land has been graded and provisions made for additional construction which will as much as triple the present floor space as future needs arise. The company produces heavy duty rubber stair treads, rubber landing tile and rubber mats which have been designed for safety in commercial, institutional and residential uses.

Shrum Joins Genruco

► Ralph W. Shrum, formerly technical director of Cat's Paw-Holtite Rubber Co., Baltimore, Md., has joined the Genruco Processing Co., Nashville, Tenn., as chief chemist. Mr. Shrum has served as chief chemist of the Gro-Cord Rubber Co., has worked in the research laboratory of the General Tire & Rubber Co., and has also served at the rubber plant of the International Shoe Co. A native of Missouri, he attended the University of Missouri, where he received an M.S. degree in chemical engineering in 1947.

Acushnet Process Expanding

► Acushnet Process Co., New Bedford, Mass., is now constructing a new mechanical goods plant at Fort Worth, Texas, according to current reports. Richard G. Ruby, it is believed, will head up the operation.

West Coast News

► In order to improve service to dealers, the West Coast Division of the Pennsylvania Tire Co. has moved its Oakland, Calif., headquarters and warehouse facilities to 655 Kennedy St. Nearly a 50 per cent increase in space was realized with the shift of operations to the new location.

► Pacific Moulded Products Co. has announced the appointment of Russell L. Nagel as plant production manager. Mr. Nagel has served in many capacities within the plant.

► Cal Simon, formerly of Rubber Machinery, has established his own business, Rubber Equipment, Inc., at El Monte, Calif.

► Jim Butler has been named chief chemist at the Lamb Rubber Corp.

► Joe Jones has joined the technical staff of Byron Jackson.

Expands Sales Staff

► National Polychemicals, Inc., Wilmington, Mass., has announced that it has expanded its sales staff to handle increased volume of business, including sales of products manufactured by its recently formed Synthetic Resin Division. Newly appointed to the sales staff were John C. Haughey and Norman W. Torgersen. Mr. Haughey, previously with Epsco, Inc., has been named manager of midwestern sales, and Mr. Torgersen, formerly assistant treasurer of Stickney & Poor Spice Co., has been appointed New England sales representative. The company also announced that Francis X. O'Keefe, formerly administrative assistant for the firm, has been named sales coordinator, and John C. Blackwood, who joined the company in early 1959, has been appointed manager of Eastern sales.

Develops Pier Shock Fender

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced the development of a pier shock fender that is said to be capable of withstanding impact of nearly 300,000 pounds per foot. The fender, a massive tube of synthetic rubber, was introduced during a recent convention of the American Association of Port Authorities, at West Palm Beach, Fla. According to Goodyear, such fenders, used at strategic points on piers and pilings, all but eliminate damage to the fixed installations from the crushing weight of a docking ship.

Big or little, all sizes and shapes...

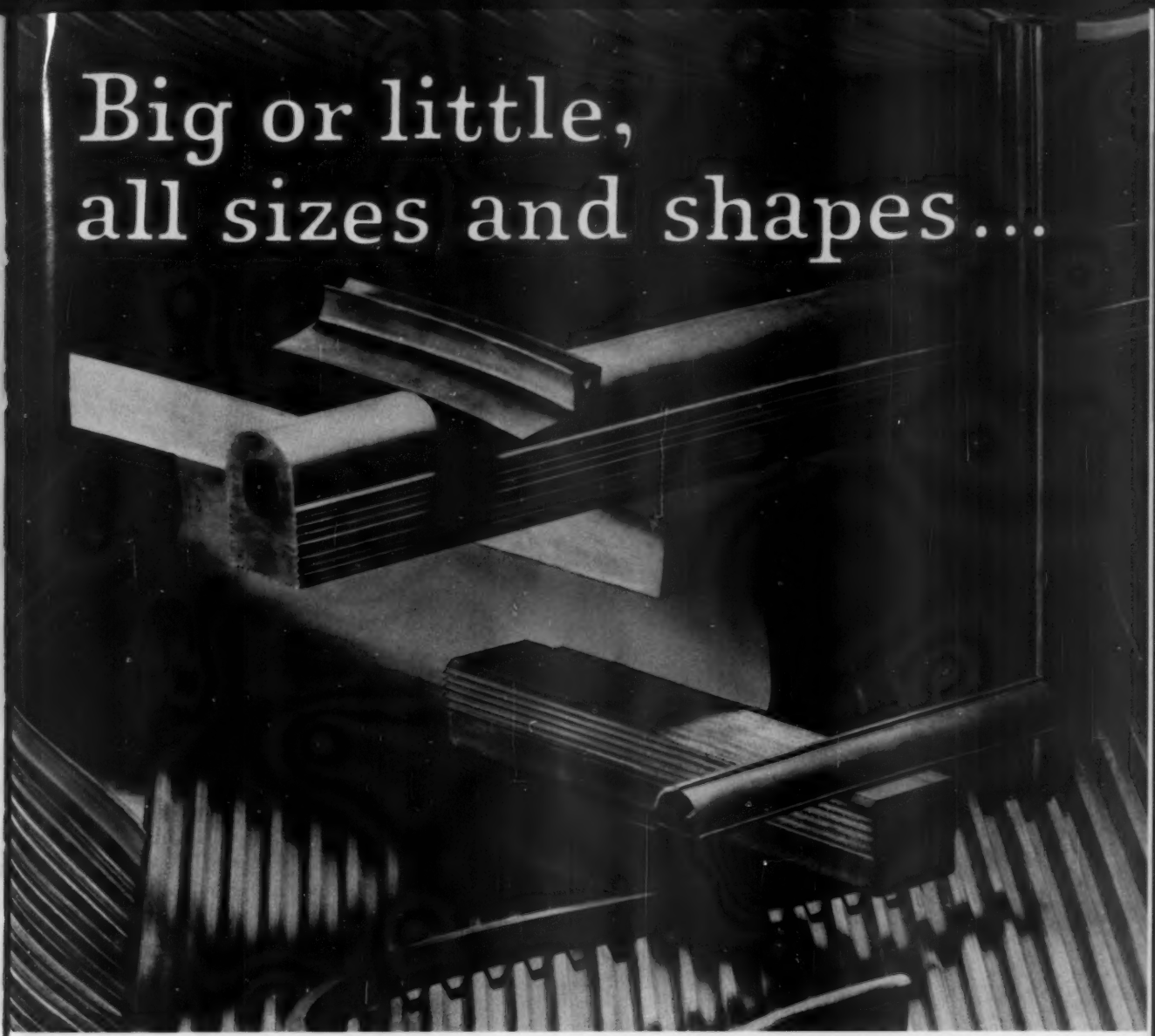


Photo shows some of the thousands of different extrusions made at Pawling Rubber Corporation, Pawling, N. Y.

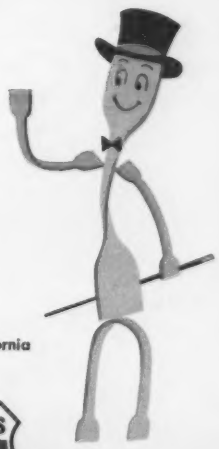
You are money ahead with Philprene* rubber

FOR ALL TYPES OF EXTRUSIONS

Take Pawling Rubber Corporation, for example. This custom manufacturer makes thousands of extrusions—and they find that Philprene polymers and masterbatches provide profitable processability. Philprene rubber is of uniform high quality, assures accurate dimension of the cross section, and produces a tough, durable finished product. Philprene masterbatches give fast, smooth extrusions, reduce Banbury mixing time, eliminate black storage. Cleaner to handle, too.

Let your Phillips technical representative show you how to speed up production. He knows which Philprene polymers and masterbatches are best suited to *your* operation. There's a wide choice. You can get what you want and need when you order Philprene rubber.

*A trademark



PHILLIPS CHEMICAL COMPANY

Rubber Chemicals Division, 318 Water St., Akron 8, Ohio

District Offices: Chicago, Dallas, Providence and Trenton • *West Coast:* Harwick Standard Chemical Company, Los Angeles, California

Export Sales: Phillips Petroleum International Corporation, P. O. Box 7239, Panama City, Panama

Distributors of Phillips Chemical Company Products, 80 Broadway, New York 5, N. Y.

Philprene PHILLIPS 66

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UNSURPASSED ATTENTION TO QUALITY CONTROL. Our business depends on how Philprene* rubber performs in *your* business. So, every step of the way from the raw material to the finished polymer, Philprene rubber must pass test after test . . . for quality, uniformity, physical characteristics, processing properties. When you order Philprene rubber you can be comfortably *sure* that every batch will live up to, or even exceed, specifications.

PROMPT DELIVERY. Your operation need never be held up or even slowed down because of tardy deliveries of Philprene rubber. At all times, there are abundant supplies on hand, at strategically located warehouses, ready to be rushed to your plant the moment your order is received. Phillips efficient service and dependable on-time deliveries help you meet *your* delivery dates.

ALL PHILLIPS REPRESENTATIVES ARE TECHNICALLY TRAINED. Your Phillips man is not just a salesman. His technical training and practical experience in the rubber field can help you solve difficult processing problems. He takes a personal interest in your business . . . consult him with no feeling of obligation.

"SALES-SLANTED" RESEARCH AND PRODUCT DEVELOPMENT. Phillips maintains a modern technical service laboratory to help with your individual rubber problems. Phillips technical service research comes up with answers to such questions as how to make rubber products more saleable . . . and how to give you a better profit at the same time.

UP-TO-DATE TECHNICAL LITERATURE. Phillips customers are kept advised of recent discoveries and developments by informative bulletins, published and sent you regularly. The Philblack and Philprene Formulary, available on request, contains detailed and workable recipes with emphasis on the development of easy-to-process stocks . . . simple, practical formulas indexed for ready reference. An invaluable handbook for rubber compounders and manufacturers of various rubber products.

WIDE RANGE OF POLYMERS. Because Phillips offers you such a variety of polymers, you can select one (or combination) that's practically made to order. Just tell your Phillips representative the qualities you need. He will help you choose the Philprene rubber that suits your requirements.

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Philprene PHILLIPS 66

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Goodyear Foundation Makes Grant

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced that the Goodyear Foundation has awarded $2,000 to the Texas Foundation of Voluntary Supported Colleges and Universities. According to the company, all the non-tax supported, church related colleges and universities in Texas now hold membership in the Texas Foundation of Voluntary Supported Colleges and Universities. The cash grant was presented to J. R. Griggs, executive director of the Texas Foundation, by B. A. Rosinski, Houston, Texas, plant manager for Goodyear. The company also announced that in 1959, the Foundation will have provided $161,000 in grants and scholarships to many higher-education institutions throughout the United States. Direct grants-in-aid to schools and foundations of independent colleges will total $116,000.

Fellowships in four fields are also included in the Goodyear Foundation activities. The fields are rubber chemistry, University of Akron; industrial economics, M.I.T.; aeronautical engineering, M.I.T.; and advanced highway engineering, International Road Education Foundation. The Foundation also sponsors the Goodyear International Fellowship, which pays all expenses for one year in the United States to a student from a foreign country where Goodyear operates. The Goodyear Foundation is a tax exempt charitable foundation which is supported by contributions from the Goodyear Tire & Rubber Co.

Forms Pigment Department

► Dyestuff and Chemical Division, General Aniline & Film Corp., New York, N. Y., has announced the establishment of a new and separate Pigment Department. According to the company, the new department was formed in line with the increasing emphasis and importance of pigment manufacture, research, sales and applications. The company reports that previously it has handled both pigments and dyes as a unit in sales and production, and major changes in personnel alignment and sales reorganization will mark a significant shift in company policy in the pigment field. In addition to the recent appointment of Dr. Robert E. Brouillard as manager-pigments, the company has announced the appointments of: Dr. Leon Katz as product manager-pigments; Maurice L. McCord as Western regional manager; John D. Shaw as Eastern regional manager; Theodore B. Smock as Mid-Western regional manager; and Emil A. Wich as manager of technical services.

► All of the capital stock of Muscle Shoals Rubber Co., Inc., and the Muscle Shoals Sales Co., Inc., Sheffield, Ala., has been purchased by Cowles Horton, Jr.

Walter E. Anderson

Joins Scott Testers

► Walter E. Anderson has been appointed sales engineer for Scott Testers, Inc., Providence, R. I. In his new position, Mr. Anderson will be responsible for sales of Scott testers throughout continental United States. Mr. Anderson was previously associated in a sales capacity with the Thomas & Betts Co., and the Minnesota Mining & Manufacturing Co., covering the New England area. A veteran of World War II, he is a member of the Essex County Electric League and the Southern New England Textile Association.

Discuss Natural-Synthetic

► In an article in the December issue of "Battelle Technical Review," Norman Broadway and Stephen Palinchak (Battele Memorial Institute), state that discoveries made by scientists that led finally to the development of synthetic "natural" rubber have overshadowed the importance of the long-sought substitute itself. The authors point out that by the time synthetic natural rubber became a reality in 1954, the various synthetic rubbers developed during World War II were replacing natural rubber for a number of purposes. Thus, the century-old dream of synthesizing natural rubber was almost unnoticed except by polymer scientists.

Nevertheless, say the two Battelle scientists, discovery of the synthetic natural rubber is important in that it is associated with the development of a new polymerization system by which scientists can combine molecules in an orderly arrangement and thereby produce polymers that were formerly impossible to obtain. The significant value of the preparation of synthetic natural rubber, apart from its connection with a new polymerization system, Broadway and Palinchak observe, is that the world will no longer be dependent on the supply of natural rubber which is centered in areas such as Ceylon and Sumatra.

AviSun Produces Olefane

► Commercial production of Olefane, a high-clarity, high strength polypropylene film for packaging applications, has been announced by AviSun Corp., Philadelphia, Penna. Manufacturing facilities located at New Castle, Del., having a capacity of 10 million pounds per year, will produce film from one through four mils for general packaging use and sheets from four to twenty mil thickness for thermo-forming. Avisun has already put on stream a unit at Port Reading, N. J., for producing 20 million pounds per year of polypropylene polymer. This polymer will be used in the Olefane film. Early in 1960, AviSun will also enter the polypropylene fiber market. Construction of pilot plant facilities is currently underway at New Castle.

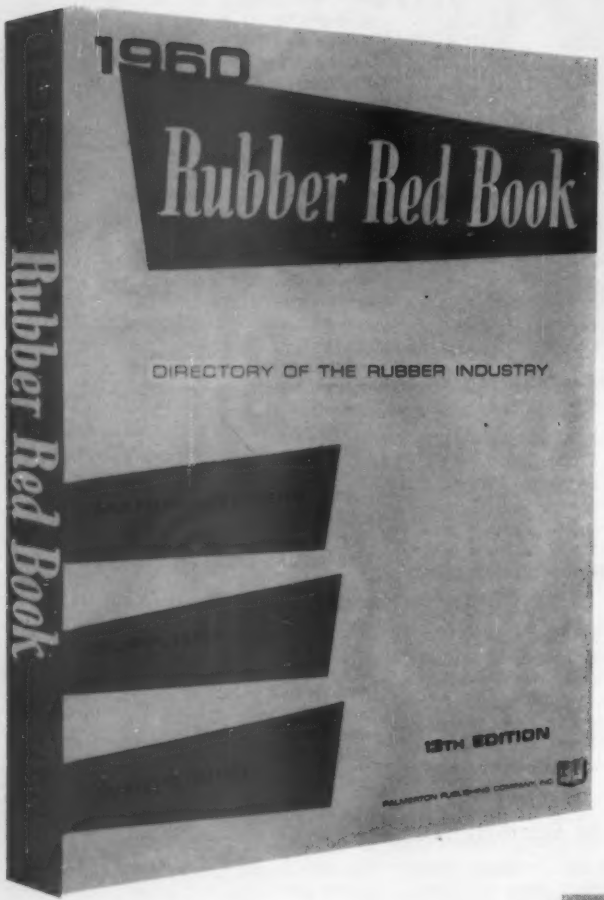
The AviSun Olefane is offered in rolls from 2½ to 60 inches in width. It can be treated for printing or untreated, with either low slip or high slip coefficient of friction properties. The new Olefane film is said to have clarity; high tensile strength; high temperature resistance; high moisture resistance; abrasion resistance; no stress cracking; insensitivity to atmospheric variations; greatest area coverage per pound of any film; and good machineability. AviSun has set up a packaging testing laboratory at Marcus Hook, Penna., for constant testing and quality control as well as application testing.

Seiberling Redesigns Tire Lines

► Seiberling Rubber Co., Akron, Ohio, has introduced new models of its premium and first-line passenger tires. In a program to bring out redesigned tires in all lines, the company has a "completely new" premium-level Safety tire, a re-styled Super Service tire and new sizes in both models. Both tires are available either in nylon or the latest type of viscose cord, according to the company, and both feature a tread compounded of high-dispersion black rubber which Seiberling has trademarked Carbojet.

The premium level Safety tire of nylon construction has a wider and deeper tread in comparable sizes than previous models. All models of the Safety tire feature a new six-rib tread design to provide better non-skid qualities and quieter running. The tire still features Seiberling's "heat vents," small holes in the shoulder area which disperse flexing heat. Seiberling's Super Service tire, at the original equipment price level, also has new tread and shoulder designs and an expanded size range. It features a deep seven-rib tread and plain sidewall design. The new Super Service is available in almost all variations: nylon and rayon, tubeless and tube-type, and black and white sidewalls. It is now also being produced in small-tire sizes for the new American compact cars.

MEMO TO SUPPLIERS...



Published by the publishers of:

- **ADHESIVES AGE**
- **RUBBER AGE**

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Publication Date:
June, 1960

Condensed Schedule of Rates — 1960 Edition

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Space	1	2	3	4 or more
Page	$200	$195	$190	$185
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THE 1960 RUBBER RED BOOK
will be published in June
Reserve your advertising space now . . .

● RUBBER RED BOOK, the industry's only Directory, will be published in June, 1960. This, the 13th Edition, will continue in the same general format as the 1959 issue but will contain additional information and will be easier to use because of revisions planned for the arrangement and presentation of data in some sections. As a result, RUBBER RED BOOK will continue to be the industry's most widely used reference book. It is designed by rubber men for rubber men and is kept in tune with the times by a program of constant reader study. It is, to many users, a "bible", and technologists of every type, purchasing agents, plant management, suppliers and consultants all find in its pages the answers to their own problems.

● Contents

RUBBER RED BOOK consists of three main sections—

Rubber goods manufacturers listed three ways—alphabetically, geographically and by product group.

Suppliers—showing complete product classification of machinery and equipment, chemicals, fabrics, raw rubbers, latex, etc.

Who's Who—15,000 names, titles and company connections of members of the industry.

In addition, there are classifications covering Chemical Brand Names, Consulting Technologists, Technical Journals, Educational Courses in Rubber Technology, and Trade and Technical Organizations.

● Distribution

Following standard practice, more than 2,000 copies of RUBBER RED BOOK are personally addressed to key people in rubber goods plants. Purchasing agents, plant executives, technologists and engineers in every known rubber goods plant in the U. S. and Canada are thus provided with copies of each edition. These are the men who buy—select—specify the products their plants use. RUBBER RED BOOK is an established habit with these men; they rely on it as a primary source of buying information.

Depending on size, each rubber goods plant receives from one to 20 copies. In addition, these plants buy many additional copies at $15 each, thus providing complete coverage of the industry. Suppliers, salesmen, large users of rubber products, exporters, librarians and others buy enough additional copies to make total distribution approximately 4,000 copies.

● Catalog Inserts Possible

Suppliers can make RUBBER RED BOOK advertising serve two purposes: (1) Advertising and (2) Catalog Sales Literature, by having the publisher print inserts at very substantial savings. Under this plan, the publisher prints enough copies for use as an insert in the Directory plus as many additional copies as the advertiser wishes for distribution through his sales staff, etc. Rates for this service are based on the size of the catalog and the number of extra copies required.

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● Order space now

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PALMERTON PUBLISHING CO., INC.
101 West 31st Street, New York 1, New York

Obituaries

Alfred W. Hanmer

► Alfred W. Hanmer, sales manager of Durez Plastics Division, Hooker Chemical Corp., Niagara Falls, N. Y., died on November 10 at Columbia Presbyterian Hospital in New York City. He was 55 years of age. Mr. Hanmer received a chemical engineering degree from the University of Maine in 1926. He started with Durez in 1929 as a sales engineer, advancing to sales manager and later being named vice-president of molding compound sales. During World War II, Mr. Hanmer was an active member of several committees of the National Production Authority as well as the Office of Price Stabilization. He was a member of Plastics Pioneers, the Plastics Committee of the Manufacturing Chemists Association, the National Sales Executives, the Chemists' Club of New York City, and a director of the Society of the Plastics Industry.

William S. Rea

► William S. Rea, sales consultant for the United Carbon Co., died on November 25 at San Bruno, Calif. He was 66 years old. Mr. Rea, a native of San Francisco, Calif., graduated from the University of California with a B.S. degree in 1916. Following his graduation, he entered the United States Navy and served on a troop transport ship during World War I. Prior to joining United Carbon in 1929, Mr. Rea was associated with the Chicago Color Co., West Coast Calcimine Co., and Binny and Smith Co. At United Carbon, he rose to the position of Eastern district manager. He later became a sales consultant for the company and transferred to California in 1952. He was a member of the Northern California Rubber Group. Mr. Rea is survived by his wife and three sons.

Frank H. North

► Frank H. North, representative for the Harchem Division of Wallace & Tiernan, Inc., Belleville, N. J., died on November 21. Mr. North attended the Newark College of Engineering, graduating with a B.S. degree in 1934. Immediately afterwards, he joined the U. S. Rubber Co. in Passaic, N. J., leaving that firm in 1936. He served with the Flintkote Co., International Plastics and the Marko Chemical Co., before joining Harchem, then the W. C. Hardesty Co., in 1946. While with Harchem, Mr. North covered most of the states in the Midwest and East. In recent years, his activities were confined to New York State, New Jersey and Philadelphia.

Alfred P. S. Bellis

► Alfred Peter Skillman Bellis, retired chief electrical engineer for the John A. Roebling Sons Co., Trenton, N. J., died on November 11, in Mercer Hospital, Trenton, N. J. He was 78 years of age. Mr. Bellis started with the company in 1900, retired in 1948 and continued to serve as an adviser on engineering matters. Mr. Bellis received a degree in mechanical engineering from Lehigh University in 1909, and during World War I, was general superintendent in the Electric Wire and Cable Division of Roebling. In 1924, he was appointed assistant general manager in the firm's Insulated Wire Division. Mr. Bellis was a member of the Army Ordnance Association and the State of New Jersey Board of Professional Engineers and Land Surveyors. He was a director of the Trenton Chamber of Commerce and a past president of the Engineers Club of Trenton. He is survived by his wife.

Sylvester D. Fitzpatrick

► Sylvester D. Fitzpatrick, assistant secretary of Anaconda Wire & Cable Co., New York, N.Y., died on November 18. He was 61 years of age. Mr. Fitzpatrick graduated from Fordham University in 1918 with a B. S. degree. He had been associated with the Anaconda organization since 1924 when he began his employment with the American Brass Co., an Anaconda subsidiary. When the Anaconda Wire & Cable Co. was formed in 1929, he joined that company and has been an officer of the company since 1930. In 1952, in addition to serving as assistant secretary, he was named assistant to the president. He is survived by his wife, four sons and two daughters.

C. R. Conklin

► C. R. Conklin, general sales manager of Republic Rubber Division of Lee Rubber & Tire Corp., Youngstown, Ohio, died on November 3 in the Edgewater Beach Hotel, Chicago, Ill., while attending a meeting of the Central States Industrial Distributors' Association. He was 63 years old. Mr. Conklin, born in 1896, studied mechanical engineering at Drexel Institute and later joined U. S. Rubber Co. and Crandall Packing Co., as a sales representative. During World War I, Mr. Conklin served in the United States Navy, and during World War II, he was in Washington, D. C., as a special representative for his company. Mr. Conklin is survived by his wife, a son and a daughter.

Rees F. Tener

► Rees F. Tener, assistant chief of the Testing and Specifications Section for the National Bureau of Standards, Washington, D. C., died suddenly on December 25. Mr. Tener, a native of Sinking Spring, Ohio, received an A.B. in chemistry from Marietta College in 1920 and an M.S. degree from George Washington University in 1926. He also had taken graduate courses in chemistry at the University of Akron and Ohio State University. Mr. Tener served in the Army from 1916 to 1919 and taught physics and chemistry in Barberton, Ohio, high schools from 1922 to 1924. In 1924, he joined the staff of the National Bureau of Standards, serving in the Rubber Section until 1930, then Mr. Tener served in the Testing and Specifications Section until his death.

Mr. Tener received the Department of Commerce Meritorious Service Award in 1953 for outstanding work in the development of federal specifications and test methods for rubber products, floor coverings, brushes, gaskets, hose, and other organic fibrous products. He was the author of several papers relating to the aging of rubber and its properties at high and low temperatures. He was particularly active in the work of the American Society for Testing Materials and served as chairman of subcommittees of Committees D-11 on Rubber and Rubberlike Materials and D-13 on Textile Materials.

The National Bureau of Standards was represented by Mr. Tener on the American Standards Association's Sectional Committees C-8 on Insulated Wire and Cable, L-14 on Textile Test Methods and L-24 on Institutional Textiles. He served as vice-chairman of the Arrangements Committee for the International Rubber Conference held in Washington, D. C., November 8 to 13, 1959. He was a member of the American Chemical Society, American Society for Testing Materials, Washington Academy of Sciences, and Washington Rubber Group.

George R. Lyon

► George R. Lyon, manager of foreign synthetic rubber projects for the Goodyear Tire & Rubber Co., Akron, Ohio, died on November 30 in City Hospital in Akron. He was 58 years of age. Mr. Lyon, a graduate of Ohio State University with a degree in chemical engineering, had been with Goodyear for 30 years. He had served as plant manager of synthetic installations and in 1950 was named production manager of all synthetic operations. He was appointed manager of foreign synthetic rubber projects in February, 1959. Mr. Lyon was a member of the University Club of Akron, the American Chemical Society, and the American Institute of Chemical Engineers. He is survived by three sons.

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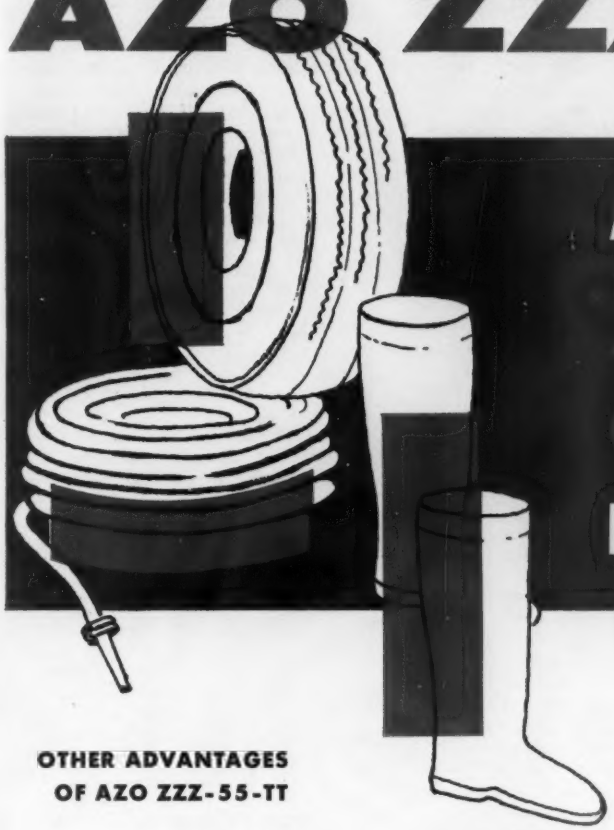
AZO ZZZ-55-TT



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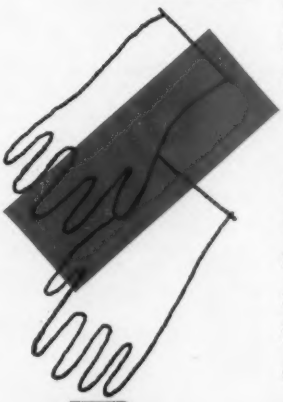
AZO rubber grade zinc oxides are also available as AZODOX (de-aerated). AZODOX has twice the apparent density, half the dry bulk.



AZO ZZZ-55-TT is heat treated in a controlled atmosphere that removes objectionable trace elements and enhances mixing and dispersion. In addition, it is treated chemically to improve mixing and dispersion properties to an even greater degree.

AZO ZZZ-55-TT is a general purpose, smooth processing zinc oxide. We can highly recommend it to users who desire a treated zinc oxide. May we suggest that you try it in your most exacting recipes. Samples on request.

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Walter J. Murphy

► Dr. Walter Joseph Murphy, editor of publications for the American Chemical Society, died onNovember 27 in Georgetown University Hospital, Washington, D.C., after an illness of several weeks. He was 60 years old. Dr. Murphy was a director of the society's news service and was widely known as a speaker and author on scientific and professional subjects. A native of Brooklyn, N. Y., Dr. Murphy received a B.S. degree in chemistry from Brooklyn Polytechnic Institute in 1921, and was on the research staff of the Air Reduction Co., before becoming a sales engineer for the American Cyanamid Co., in 1922. In 1925, he joined the U. S. Rubber Co., and later served as vice-president of George Chemicals, Inc., and of Seaboard Crystal Co. In 1928, he became sales assistant to the president of the Mutual Chemical Co. of America.

Dr. Murphy entered the editorial field in 1930 as managing editor of *Chemical Markets*, later known as *Chemical Industries*. He joined the American Chemical Society in 1942 as editor of *Chemical and Engineering News* and *Engineering Chemistry*. Other publications under his guidance were *Analytical Chemistry*, *The Journal of Chemical and Engineering Data*, and *the Journal of Agricultural and Food Chemistry*. In 1947, Dr. Murphy received an honorary degree of Doctor of Science from Centre College. He won the Gold Medal of the American Institute of Chemists in 1950 for his services to the chemical profession and his outstanding ability as a technical editor. He received the Honor Scroll of the Division of Industrial and Engineering Chemistry, ACS, in 1953, and an Honor Scroll from the American Section of the Societe de Chimie Industrielle in 1958.

Dr. Murphy was a member of the American Chemical Society, the Society of the Chemical Industry, the Societe de Chimie Industrielle, the American Institute of Chemical Engineers, and the Salesmen's Association of the American Chemical Industry. He was a Fellow and honorary member of the American Institute of Chemists and a Fellow of the American Association for the Advancement of Science.

James A. Scellen

► James Albert Scellen, a chemist for the Kirkhill Rubber Co., Brea, Calif., died on November 22 at his home in Fullerton, Calif. He was 55 years old. A native of Kitchener, Ontario, Canada, Mr. Scellen graduated from the University of Michigan and afterwards joined the Dominion Rubber Co. as a chemist. Prior to joining Kirkhill Rubber, he was with Pequanoc Rubber Co., for 16 years as a technical representative. Mr. Scellen was a member of the American Chemical Society, and the New York, Chicago and Detroit Rubber Groups.

Harry E. Smith

► Harry E. Smith, retired vice-president in charge of rubber products sales of Raybestos-Manhattan, Inc., Passaic, N. J., died on November 2 in Memorial Hospital in Sarasota, Fla. He was 70 years of age. Mr. Smith joined the Manhattan Manufacturing Rubber Co. in 1909 as a clerk. By the time of the merger of Raybestos and Manhattan in 1929, Mr. Smith was serving as sales manager for Manhattan. He became general manager of the Manhattan Division plant in 1942, and vice-president of Raybestos-Manhattan in 1944. In 1946 he became vice-president in charge of rubber sales for the company. He had served as a director and member of the executive committee of the company from 1941 until his retirement in 1954. Mr. Smith was a member of the Rubber Manufacturers Association and the Rubber Advisory Panel to the United States Department of State. In the latter capacity, he attended an International Rubber Conference in England during World War II. He is survived by his wife and a son.

Richard B. Tucker

► Richard B. Tucker, retired executive vice-president and a member of the board of directors for the Pittsburgh Plate Glass Co., Pittsburgh, Penna., died on November 26 at his home in Virginia Beach, Va. He was 73 years of age. Born in Norfolk, Va., Mr. Tucker was a collateral descendant of George Washington. He began his business career in 1906 as manager of the John D. Gordan Co. in Camaguey, Cuba. He had been an executive of the Pittsburgh Plate Glass Co. since 1929 when he was appointed manager of glass sales for the company. Mr. Tucker retired in 1955. During his career, he had served as a member on the boards of Columbia-Southern Chemical Corp., Duplate Canada Ltd., and Canadian Pittsburgh Industries Ltd. He is survived by his wife, two daughters and a son.

Budd E. Pollack

► Budd E. Pollack, president of Gavitt Wire and Cable Co., a division of Amerace Corp., Brookfield, Mass., died on October 18 after suffering a cerebral hemorrhage. He was 50 years old. Mr. Pollack grew up in Concord, N. H., and graduated from Harvard University in 1932. He began his career with American Hard Rubber Co. as a senior engineer in 1946, later becoming a staff executive engineer and in 1949 secretary of the company. In 1957, he was appointed executive vice-president and general manager of the Pequanoc Rubber Co., then a subsidiary of American Hard Rubber Co. He became president of Gavitt in December 1957. He is survived by his mother, wife, a son and one daughter.

Henning W. Prentis, Jr.

► Henning W. Prentis, Jr., chairman of the Armstrong Cork Co., Lancaster, Penna., died on October 29 in Lancaster. He was 75 years of age. Mr. Prentis received a B.A. degree from the University of Missouri and an M.A. degree from the University of Cincinnati. Prior to joining Armstrong, he was secretary of the University of Cincinnati, and from 1903 to 1905, he was secretary to the president of the University of Missouri. Mr. Prentis joined Armstrong as assistant manager of its Insulation Division in Pittsburgh, Penna., and later served in the Advertising Department and the Floor Division.

In 1934, Mr. Prentis became president of Armstrong Cork, and had been serving as board chairman since 1950. In 1942, he was deputy director of the War Production Board in Philadelphia, Penna. In 1954, he was named by former President Herbert Hoover to head a task force to study all phases of overseas economic operations by United States government agencies. Mr. Prentis received the Legion of Honor from France in 1954, and in 1956 he was awarded the Henry Laurence Gantt gold medal of the American Management Association and the American Society of Mechanical Engineers. He is survived by his wife.

John R. Millar

► John R. Millar, retired board chairman of National Automotive Fibres, Inc., Detroit, Mich., died on December 2 at Paralta Hospital in Oakland, Calif. He was 72 years old. Mr. Millar was the son of J. Y. Millar, the founder of the California Cotton Mills. He served as vice-president and general manager of the company until 1928, when he joined National Automotive in Detroit. He was a former president of the California Manufacturers Association.

Russell M. Kellum

► Russell M. Kellum, senior domestic sales representative of International B. F. Goodrich, died on November 10 in New York City. He was 51 years old. A graduate of Ohio Wesleyan University, Mr. Kellum joined Goodrich in 1935 and held various assignments in the Sales and Credit Departments. In 1947, he served as manager of the company's sales operations in Puerto Rico. He is survived by his wife.

Newton F. McKeon

► Newton F. McKeon, retired superintendent and general manager of Eureka Fire Hose Co., Jersey City, N. J., died on November 18 at his home in Amherst, Mass. He was 92 years old. In 1931 Mr. Keon retired from the Eureka company, which later was absorbed by the U.S. Rubber Co.

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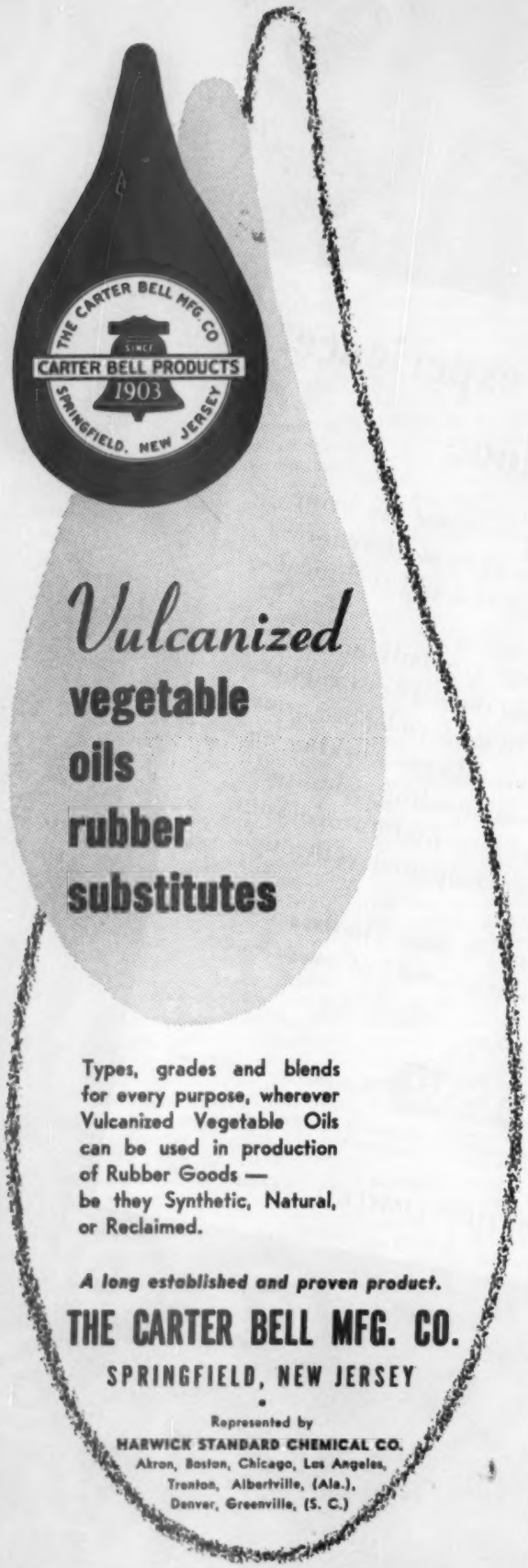
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Overseas

Djakarta—The worst floods since 1930 have engulfed several parts of East Sumatra including several low lying rubber estates, according to current reports.

Rome—Societa per Azione Plastica Italiana (Italian Plastics Co.) has started building a large factory at Trino Vercellese for the manufacture of plastics. The organization was formed by four large foreign countries including Marley Tile Co., Ltd., London; Fademac Societa Anonyme, Brussels; Dalamai Societe Anonyme, Paris; and Johns-Manville Corp., United States. The factory, which will occupy 58,000 square meters of space, will produce mainly thermoplastic materials for the building industry, thermoplastic tiles and plastic accessories. Production is scheduled to begin early in 1960.

Canberra—B. F. Goodrich Australia, Pty., Ltd., a partnership between the B. F. Goodrich Co. and Ampol Petroleum, Ltd., of Australia, began tire production in December, three months ahead of schedule. Tires manufactured in a new plant near Melbourne will go on sale in Australian markets in March. First production will consist of passenger tires followed by commercial truck tires.

Tokyo—A carbon black plant using the Phillips Petroleum Co. process will be constructed in Japan by Showa Denko, K. K. The Japanese firm has been licensed by Phillips to use its process for producing oil furnace black. Design work on the new plant, which is expected to be in operation within two years, is being done by Phillips.

Rio De Janeiro—A "war party" has been organized to wipe out savage Chikin Indians who have slain seven rubber gatherers in that area. The Par jungle Indians have been marauding rubber plantations in the Xingu River section.

Paris—Firestone France S. A., a French branch of the Firestone Tire & Rubber Co., will be established shortly. The branch will have an initial capital of 1,000 million francs, shortly to be boosted to 2,000 million. It will build two mills in France, one to make tires and the other for synthetic latex, copolymers of butadiene and styrene. Investment is estimated at $14 million. Plant location has not yet been determined.

Tokyo—Japan Geon Co. has built a plant Southwest of Tokyo for the production of 8,400 tons of synthetic rubber annually, in accordance with a technical agreement with Goodrich Chemicals Inc. Another factory is being built near Nagoya, Central Japan.

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New Goods

Collapsible Rubber Tube

► A giant collapsible rubber tube, developed by the U.S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., is said to enable a new, multi-purpose shipping container to carry 4,000 gallons of liquid along with automobiles. Called a Sealdtank, the rubber tube can be placed beneath two automobiles, or it can be rolled up like a rug to occupy a small space when other commodities are to be shipped. The container itself, built by the Strick Trailer Division of Fruehauf Trailer Co., can be used as a truck trailer, for piggy-back rail shipments, or for ship and plane transport. The Sealdtank is made of a rubber-coated rayon fabric, formed in plies. Both ends are sealed by metal closures resembling spinal columns. The Sealdtank in the Strick container is 35 feet long, and can fold into a package less than two feet high and just over seven feet wide. The company reports that with a Sealdtank, a shipper can truck liquids one way and dry commodities on the return trip to get full use of his equipment. Sealdtanks can be used to carry a wide variety of bulk liquids, including molasses, chocolate, wine, vinegar, milk and glue, the company states.

Polka-Dots for Tires

► Dot-O-Wol, 1126 S.W. Morrison, Portland, Ore., has developed small colored discs of rubber which can be cemented to white or black tire sidewalls. The disc consists of four layers of rubber which are fused together to a protective

Holland cloth backing. According to the company, the discs are easily affixed to the tire by means of a special vulcanizing fluid. Simply apply the fluid to the tire and press the disc in place. The manufacturer claims that the discs are resistant to severe weathering, gas, oil, tire cleaners, and even curbing.

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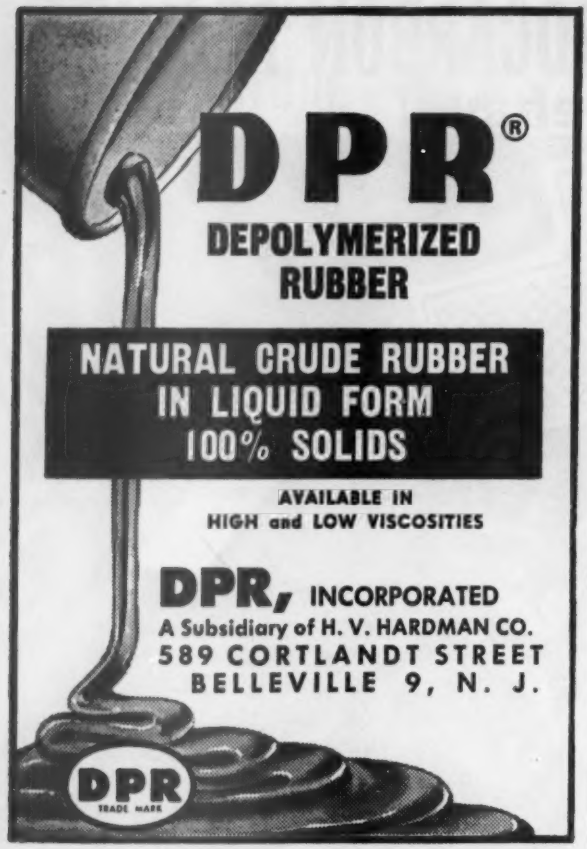

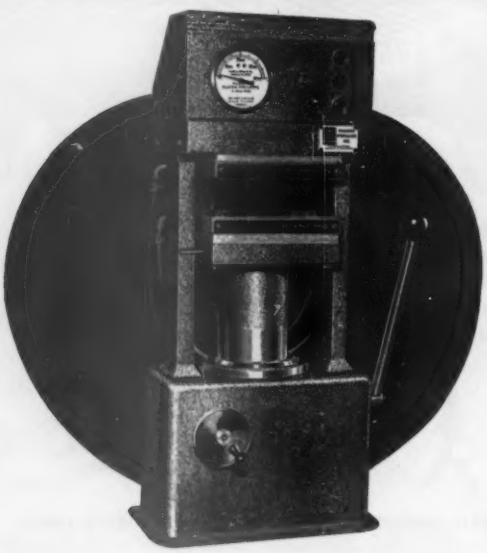

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Hood Industrial Work Gloves

► Hood Rubber Co., Watertown, Mass., a division of B. F. Goodrich Co., has announced the addition of a full line of unsupported natural rubber and neoprene latex industrial work gloves. This line of latex gloves is made by the Anode Latex Process in which a positive and negative

electrical charge between the latex and the form, builds up the gauge of rubber or neoprene with a single dip. According to the company, this produces gloves that have uniformity in construction for greater strength and longer wear, and that are more snag resistant and more impervious to penetration. A variety of styles, sizes and gauges are available for industrial use.

Conveyor Belt for 45° Idlers

► Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J., reports the development of a conveyor belt, called Ray-Man, which makes it possible to successfully use and obtain benefits of 45° troughing idlers for carrying all materials. According to the company, a conveyor belt has much greater hauling capacity with 45° idlers than with the conventional 20° idlers. Ray-Man construction is compensated so that the outer ply stretches as the inner ply contracts under both lateral and longitudinal flexing, and even on reverse bends. The outer strength member plies are constructed with a special weave high strength synthetic fabric of carefully controlled elasticity, which relieves the stress on the belt as it travels over idlers and terminal pulleys, the company states.

Barr Mira-Toy Farm Tractor

► Barr Rubber Products Co., Sandusky, Ohio, has introduced the Mira-Toy farm tractor with a connecting train of two farm wagons, which are available in bright colors. The farm tractor is 5¾ inches long, 4¼ inches wide and 3 inches high and the wagons are 5½ inches long, 2½ inches wide and 2¼ inches high. A complete set of tractor and two wagons are packaged in a see-through displayer which conforms to the contour of the set. These toys are made of flexible, unbreakable polyethylene with plastic wheels and metal axles, the company states.

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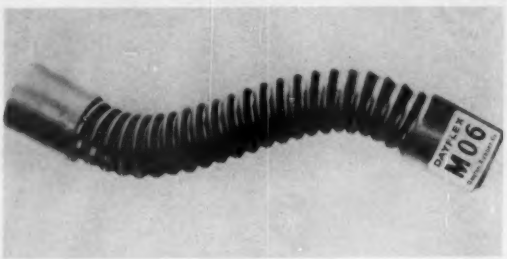
Dayflex High Pressure Radiator Hose

► A new molded synthetic rubber, high pressure radiator hose developed to service advanced high pressure cooling systems has been developed by Dayton Industrial Products Co., Melrose Park, Ill. The manufacturer claims several advantages for the new hose, called Dayflex: it is stronger, won't corrode, gives better protection, fits radiator and block connections better, and looks better



than hose previously developed for high pressure systems. Dayflex comes in 22 sizes designed to fit 90 per cent of the cars on the road today.

The hose has an over-all fabric covering that reinforces and withstands eight times more pressure than other type hoses, eliminates elongation and ballooning and gives the hose greater strength, the company claims. The hose is precision molded around spiral-wound tempered steel wire to prevent hose collapse. The wire is completely molded in to prevent rusting. The hose is made of synthetic rubber designed to withstand the effects of all types of anti-freeze solutions, harsh cooling system cleaners, oil, grease and engine heat. Hose end caps are reported to be very flexible and made extra long for easy fit and sure connections that resist cracking and breaking.

507 Terylene Sheeting

► A lightweight, long-wearing and waterproof hospital sheeting which can be autoclaved, has been developed by the Fabrikoid Division of Canadian Industries Ltd., P.O. Box 10, Montreal, Quebec, Canada. The product consists of a tough Terylene polyester fabric coated on both sides with a specially formulated rubber. It will be marketed under the name of 507 Terylene Hospital Sheeting. The company reports that laboratory and field tests have revealed the sheeting to possess excellent resistance to the action of oils, acids, alkalies and body excretions. Flexing tests showed that there was no deterioration after 500 severe cycles, and tests for water resistance showed it capable of withstanding 150 pounds per square inch of water pressure. The sheeting is the color of brick because the pigments used in brick color are among the most stable known, the company states. The Terylene sheeting is available in 25-yard rolls, 40 inches wide.

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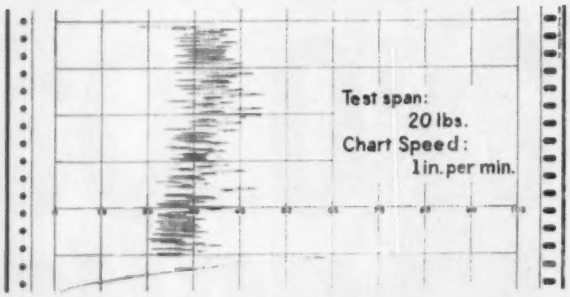

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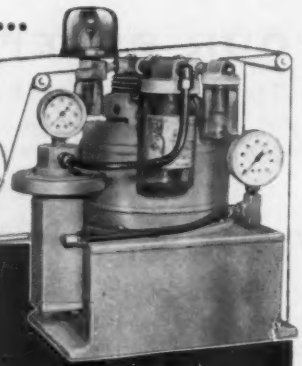

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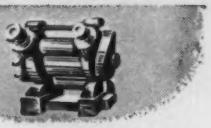
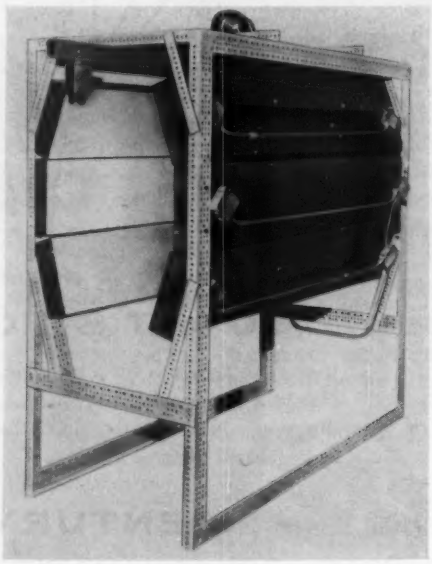


Modular Infra Red Heating Oven

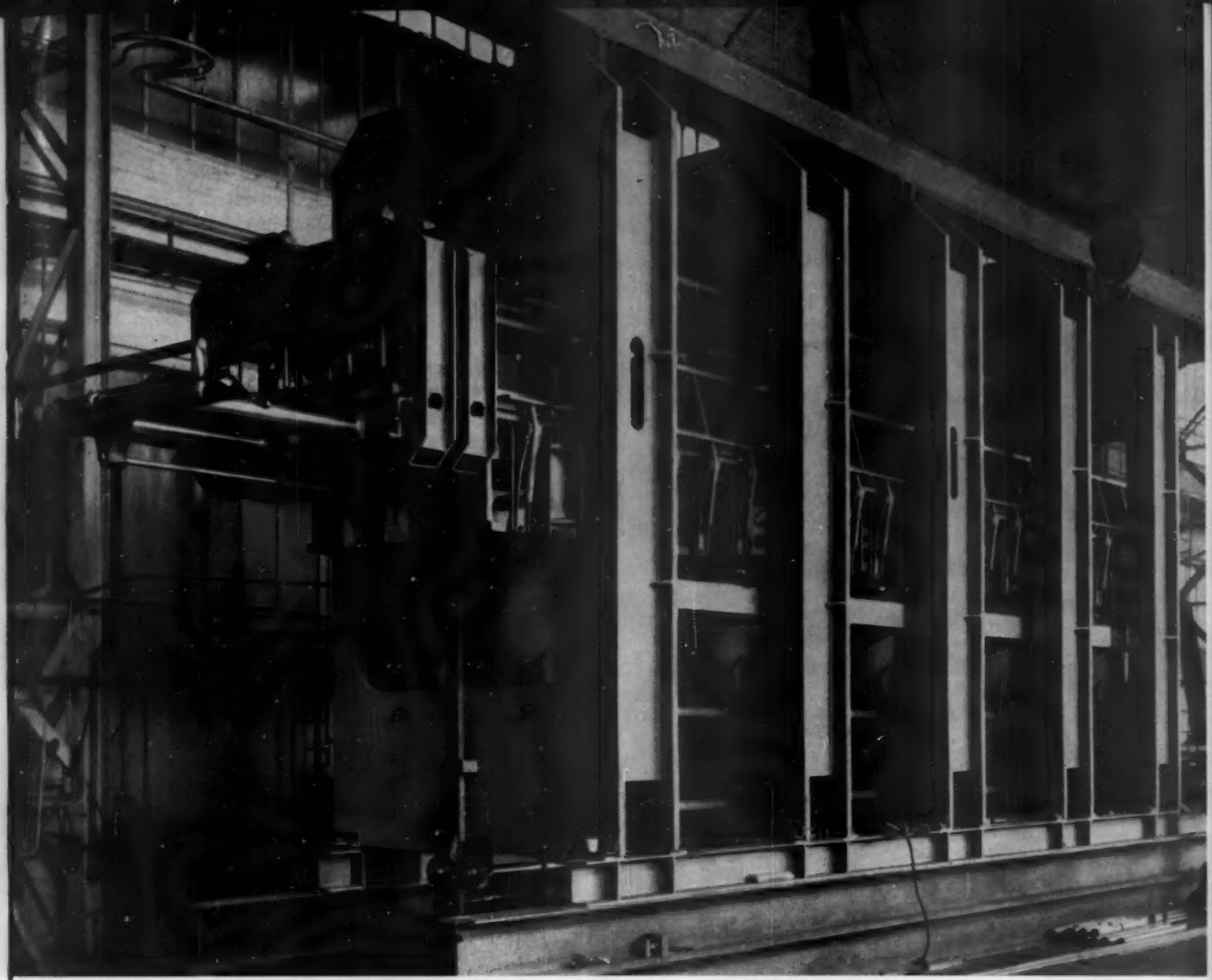
► Modular infra red ovens that can be made to fit any drying system; that give uniform heat over entire emitting area; and that can be used with any conveyor are now available from Infra Red Systems, Inc., of Riverdale, N. J. The basic module of these ovens is called RediRay, a completely self-contained heater which uses a ceramic face as a source of infra red radiation. The ceramic face is brought up to emission temperature by the formed resistance wire embedded in an insulating block back of it. The entire heating block is backed up by alternate layers of batt and reflective insulation. All are mounted in a sheet



metal shell of modular dimensions. The manufacturer claims the following advantages for the RediRay heater:

(1) Uniform, even heat—ceramic face emits heat over entire area; no hot spots; (2) Highest efficiency—no bulbs or tubes to get dirty; no reflectors to tarnish or get dirty because entire face emits heat; (3) Longer life—no bulbs or tubes to break or burn out; life of protected heating element is indefinite, and (4) "Color blind" radiation—heats all colors equally well.

Temperature control is accomplished by an adequate voltage control. The RediRay unit shown gives up to 500 watts per square foot radiation. Work temperatures go up to 400°F. Other units available go up to 2000 watts per square foot. The six-foot oven shown is a basic modular length. Another six-foot section can easily be added to double production.



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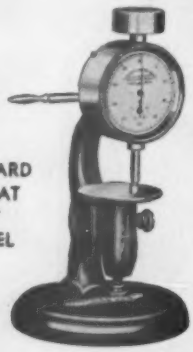

STANDARD THROAT 1¾" MODEL

THROAT DEPTHS
1¾" to 26"
FOOT TENSIONS
supplied by Internal Spring or Direct Weights
FOOT DIAMETERS
⅛" to 1¼"
ROLLS
Table and Roll or two Rolls
RANGE
½" or 1", also 1 CM Metric

26" DEEP THROAT MODEL

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Lead & Zinc Compounds

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Basic Carbonate of White Lead	Red Lead (95% 97% 98%)
Sublimed White Lead	Sublimed Blue Lead

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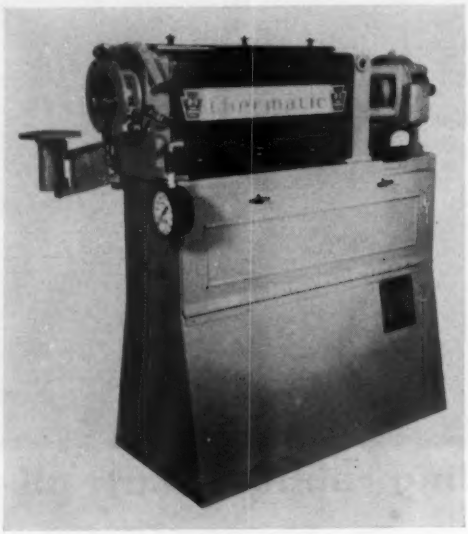
Davis-Standard Laboratory Extruder

► A 1½ inch Thermatic Extruder designed for laboratory and experimental production has been announced by Davis-Standard Division of Franklin Research Corp., Mystic, Conn. The 1½ inch Thermatic, Model 15T, is designed for speeds up to 400 rpm and features production rates of 100 pounds per hour at 3000 psi. Model 15T has separate, high-capacity thrust and radial bearings rated for an average life of more than a half million hours to provide long, trouble-free operation on a complete range of thermoplastic compounds.

This new 1½ inch model utilizes deep alumimum Therma-Fins which provide excellent cooling for all requirements. Each heat zone along



the barrel is equipped with a separate Therma-Fin and blower and is provided with a damper for infinite gradients of temperature control. Therma-Fins have cast-in heating elements for proper heating balance. Model 15T features direct drive to the thrust sleeve from any gear-head type motor via timing or V-belts. This eliminates the need for reduction gears on the drive end of the extruder. Horsepower capacity is from 5 to 25 HP.

The cylinder is of one-piece construction with an integral Xaloy liner. The feed section is a special alloy one-piece casting. The stock screw is of special alloy steel with flame-hardened flights and is cored for water cooling. The drive end of the screw is tapered and has four splines for positive centering and non-eccentric rotation at high speeds. Optional equipment on Model 15T includes a gas-tight seal at the rear of the feed section, a stainless steel feed section jacketed for cooling, a vent section on the barrel, a barrel pressure gauge and a wide selection of crossheads and dies.

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Low operating cost, simple, automatic operation... constant temperature, constant exposure and constant tension or stretch at variable line speeds... particularly adapted to tire cord processing systems... no quick cooling required, no waste or degradation of material... "Rollevators" with tensions up to 30,000 pounds are now in use.

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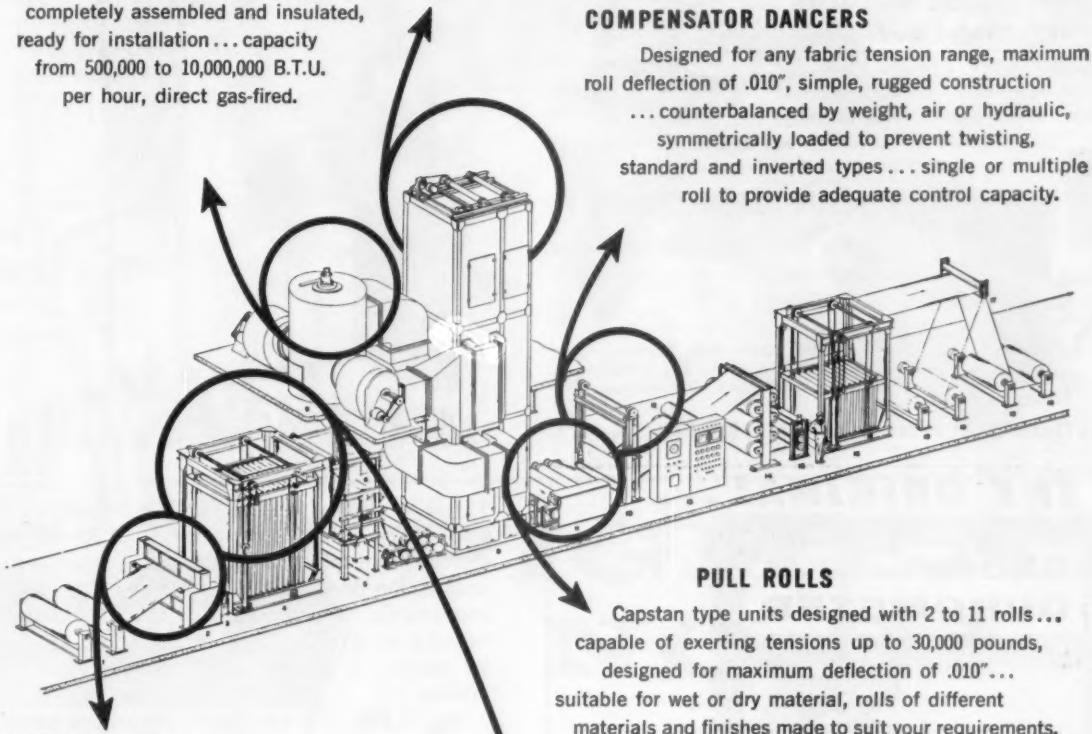
COMPENSATOR DANCERS

Designed for any fabric tension range, maximum roll deflection of .010", simple, rugged construction ... counterbalanced by weight, air or hydraulic, symmetrically loaded to prevent twisting, standard and inverted types... single or multiple roll to provide adequate control capacity.



PULL ROLLS

Capstan type units designed with 2 to 11 rolls... capable of exerting tensions up to 30,000 pounds, designed for maximum deflection of .010"... suitable for wet or dry material, rolls of different materials and finishes made to suit your requirements.

SPLICE PRESSES

Rugged, efficient and easy to operate... splice pressures to suit requirements in range of 50 to 300 tons... maximum deflection on platen .020"... close temperature tolerances... closure time 3 seconds minimum ... can be shipped completely assembled, ready for installation.

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Standard and inverted types, mechanical, hydraulic or air loaded... 20 to 220 yards storage, roll deflection can be held to .005", 100 to 2,000 pound tension on stored fabric... no warping or cocking of frames, rugged, simple, symmetrical design.

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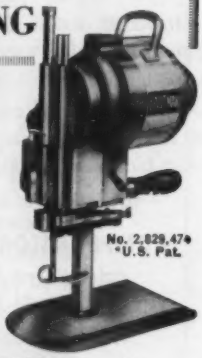

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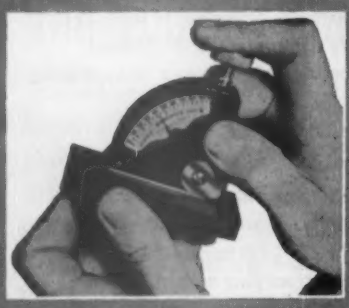

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Manufacturers of the "Scleroscope," for testing the hardness of metals.

Portable Shear Unit

► An addition of portable models to its line of high speed, high shear mixing equipment has been announced by the Specialty Machinery Corp., 50 Roanoke Ave., Newark 5, N. J. The model PM 756 will accommodate batches of 300 gallons down to 5 gallons. The unit will center in a 48 inch diameter tank which will need only 5 inches clearance underneath. For smaller batches such as

55 gallon drums the legs straddle the container. The mixer is equipped with spark-proof and solvent-proof plastic wheels and casters and a snap action floor lock is provided which instantly converts the mixer into a fixed unit. The blade is raised from 6 inches to 54 inches above the floor by means of a foot pedal operated hydraulic system.

Model PM 756 will handle viscosities ranging from water thin to over 100,000 cps. The unit is suitable for such diverse operations as tinting, making nitro cellulose solutions, water emulsions and premixing high solids, high viscosity grinding pastes. It is available in variable speed and single speed models, explosion-proof and non-explosion-proof in 5, 7½ and 10 HP. Single speed models operate at 1800 rpm. Variable speed models operate from 800 to 3600 rpm.

Heavy Duty Dry Crusher

► The No. 70-H size four crusher produced by Charles Ross & Son Co., 148-156 Classon Ave., Brooklyn 5, N. Y., incorporates a revolving crushing roll inside the hopper to give material a preliminary breaking down before being fed between hardened steel grinding plates. Grind fineness is set by adjustment of a handwheel which can then be locked. The crushers feature variable speed drive and an indicating gage to control grind fineness.

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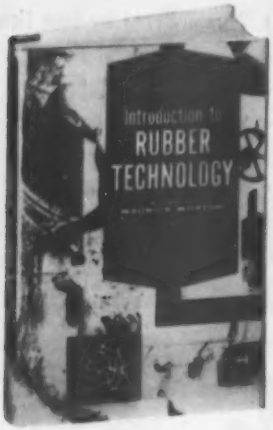

Introduction to RUBBER TECHNOLOGY

Edited by
MAURICE MORTON
Director, Institute of Rubber Research and Professor of Polymer Chemistry, University of Akron

1959, 600 pages, $10.00

A compilation of selected lectures that introduces new members of the rubber industry to the basic aspects of rubber technology.

CONTENTS AND CONTRIBUTORS:

History and Summary of Rubber—*B. S. Garvey, Jr.*
Introduction to Polymer Chemistry—*Maurice Morton*
Natural Rubber—*Otis D. Cole*
Vulcanization—*L. E. Oneacre*
Accelerators of Vulcanization—*B. S. Garvey, Jr.*
Antioxidants and Antiozonants—*R. R. Barnhart and T. H. Newby*
Rubber Plasticizers, Softeners and Extenders—*F. M. McMillan*
Carbon Black—*Milton H. Leonard*
Non-Black Compounding Ingredients—*Ralph F. Wolf*
Butadiene-Styrene Rubbers—*J. D. D'Ianni*
Nitrile and Polyacrylate Rubbers—*George A. Daum*
Butyl Rubber—*J. L. Ernst*
Neoprene—*J. P. Munn*
Hypalon—*F. Wayne Keeley*
Polysulfide Polymers—*J. S. Jorczak*
Silicone Rubbers—*J. C. Montermoso*
Reclaimed Rubber—*J. M. Ball*
Latex, Sponge and Foam—*George G. Winspear*
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Reviews

Introduction to Rubber Technology. Edited by Maurice Morton. Published by Reinhold Publishing Corp., 430 Park Avenue, New York 22, N. Y. 6 x 9 in. 547 pp. $10.00.

This basic text on rubber technology marks the culmination of a notable educational campaign launched about four years ago by the ACS Division of Rubber Chemistry jointly with the various Rubber Groups throughout the country. As synthetic rubbers and allied synthetic polymers established themselves in a prominent part of the rubber picture, authoritative information on these expanding "chemical" fields was demanded by technologists, as well as others in the sales, service and purchasing branches. Lectures held under the aegis of this program were then designated by the ACS as the raw material from which Maurice Morton, Director of the Akron University Institute of Rubber Research, would compile "an elementary textbook on rubber technology."

Dr. Morton has done an excellent job of selecting the twenty papers which cover a rapidly growing technology logically and comprehensively, as is evident from perusal of the chapter headings: History and Summary of Rubber Technology; Introduction to Polymer Chemistry; Natural Rubber; Vulcanization; Accelerators of Vulcanization; Antioxidants and Antiozonants; Rubber Plasticizers, Softeners, and Extenders; Carbon Black; Nonblack Compounding Ingredients; Butadiene-Styrene Rubbers; Nitrile and Polyacrylate Rubbers; Butyl Rubber; Neoprene; Hypalon Synthetic Rubber; Polysulfide Polymers (Thiokol); Silicone Rubbers; Reclaimed Rubber; Latex, Sponge, and Foam; Physical Testing, and Processing Equipment. The list of authors constitutes a veritable *Who's Who* of rubber technology. New members of the industry are fortunate to have the subject presented to them in elementary terms by these experts, while others should welcome the volume as a reference work or a refresher course.

The introductory tone of the compendium was maintained by excluding advanced lecture material presented in the program and by having each of the contributions begin with a definition of basic terminology. The opening chapter by B. S. Garvey Jr. covers the entire field admirably in capsule form. Photographs, tables, graphs and an index enhance the text's value. This book should become a part of the basic library of all persons associated with rubber technology.

•

Introduction to Colloid Chemistry. By Karol J. Mysels. Published by Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. 6 x 9 in. 475 pp. $10.00.

The author of this book, a distinguished chemistry professor at the University of Southern California, has distilled more than a decade of teaching and many years of research into one of the best new texts on colloid chemistry. It is addressed to beginning graduate students for use in a one-term introductory course, but should prove just as valuable to industrial chemists or executives who desire a concise survey of a field they may have neglected in their academic careers. The simple presentation, developing the subject from basic to fairly complex principles, presupposes only a grasp of physics and physical chemistry.

At the outset, some structural elements of colloidal particles are outlined, then their behavior is examined when affected only by gravitational or by van der Waals forces. Next the effect of thermal agitation alone is covered, followed by the combined influences of these

factors. Electric forces, alone and in combination, are described later, while the final section deals with optical effects: refraction, interference and scattering. A chapter on fluctuations and rubber elasticity concentrates on thermal motion of high polymer chains. Problems are provided at the end of each chapter to help the reader check his understanding of the material.

The text offers students not only a broad acquaintance with colloids, but also an insight into the basic factors responsible for observed phenomena and for the principal methods of investigation. A mastery of the subject as presented here should give a basis for understanding the main considerations involved in most practical problems. It is also a good preparation for delving into a more advanced treatment of the whole field or of special topics.

BOOKLETS, CATALOGS, etc.

This Is Rubber Today. The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York 22, N. Y. 8½ x 11 in. 20 pp.

The rubber industry's contribution to peacetime comfort and national security is emphasized in this attractive brochure that surveys recent developments to conclude on an optimistic note for prospects during the next six years. The report sets out the basic facts and figures about the industry, tells how its workers fare, and comments on the stress placed by the industry on engineering, research and development of new and improved products. It also touches briefly on the industry's great diversification to meet the demands of space travel. An appendix gives the latest statistics on rubber consumption, tire production, wage earnings and tread rubber inventories.

•

Electro-Mechanical Equipment. Hoover Electric Co., 2100 S. Stoner Ave., Los Angeles 25, Calif. 8½ x 11 in. 8 pp.

This catalog features a new line of electric actuators, 28-volt and 400-cycle motors, screwjacks, gear boxes and control equipment for aircraft, missile, ordnance, marine and industrial applications. A brief technical description of each unit is given, together with general design and operating parameters. The modular type construction of components permits users to arrange or modify them into units suited to specific applications.

•

Taylor-Styles 800 Series Cutters. (Bulletin 217). Taylor, Styles & Co., Riegelsville, N. J. 8½ x 11 in. 4 pp.

The basic properties and special functions of a line of cutters for dicing plastics and cutting continuous filaments are described in this bulletin. Individual features of each model are given in a comprehensive table. The amply illustrated text discusses operating principles of circular knives, suction and frame cutters. Maintenance instructions and suggestions regarding accessories are included.

•

Day Pony Mixers. (Bulletin 500-159). J. H. Day Co., Cincinnati 12, Ohio. 8½ x 11 in. 8 pp.

Single and twin motion change-can mixers used to process a wide range of products, such as paint, dyes, given for geared-type laboratory and production mixers, pharmaceuticals, plastics and rubber, are described in this bulletin. Construction details and specifications are as well as for gearless models. A section on accessory equipment portrays mixer cans and lift trucks.

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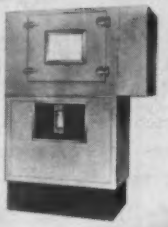

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For Molding Preparation
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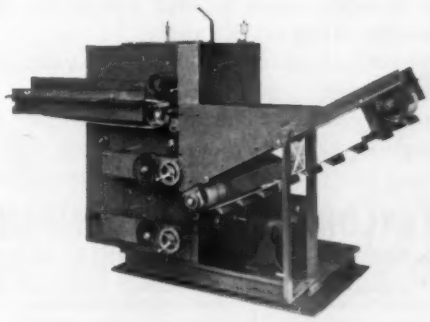

Capacity: Up to 3" OD
Lengths: ¼" to 6"
Up to 2000 cuts per Min.
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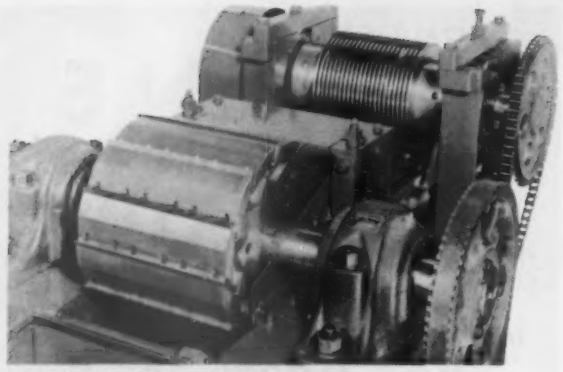

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Taylor-Stiles Dicing Machines for natural and synthetic rubber produce pellets of exact size. As a result, you can measure out mold charges with extreme accuracy. You escape getting too little material in the mold, causing voids; or too much material, forcing the mold apart.

Taylor-Stiles machines produce uniformly-sized pellets because of their positive feeding of the material to the cutting elements and their method of disc cutting sheets into strips, and cross cutting the strips into pellets.

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Why not assure exact loads for your flashless molds in transfer molding?

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Send me a copy of your descriptive folder 202 illustrating and describing your dicing machines for cutting uniform pellets for flashless molds.

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REVIEWS (CONT'D)

Adjust-O-Feeder Model 1140. (Bulletin Rev. No. 1140.20O-1). B-I-F Industries, Inc., 345 Harris Ave., Providence 1, R. I. 8½ x 11 in. 4 pp.

This revised bulletin describes the use and application of an improved model feeder designed for chemical and industrial fluid proportioning over a large range of capacities and pressures. The new version features compact pump design, minimum maintenance, great application flexibility and low-cost chemical proportioning. A capacity chart enumerates pressure ratings, specifications and dimensions to permit selection of the correct pump for the viscosity of fluid to be proportioned. It lists the viscosity in centipoises, the desirable strokes per minute for that viscosity, capacity per cylinder, maximum working pressure and the appropriate motor horsepower.

•

NSL Catalog. (Bulletins 1-12). National Spectographic Laboratories, Inc., 6300 Euclid Ave., Cleveland 3, Ohio. 8½ x 11 in. 36 pp.

This loose-leaf catalog presents a complete line of spectrographic and analytical chemical equipment and laboratory services. In consists of 12 individual product bulletins defining construction features and giving specifications for source units, microphotometers, sample holders, spectrographs, auxiliary equipment and custom units. The bulletins include: Spec Power, Petrey Stand, Dual Grating Spectograph. Grating Spectograph, Spectrol Reader, Spec Processor, Analytical Chemistry Instrumentation, Spec Comparator, Spec Reader and Spec Recorder.

•

PUP/VA Copolymers. Antara Chemicals, a Div. of General Aniline & Film Corp., 435 Hudson St., New York 14, N. Y. 8½ x 11 in. 6 pp.

This folder briefly discusses properties and uses of three vinylpyrolidone/vinyl acetate copolymers that have proved compatible with many modifiers and plasticizers. Illustrative uses of this series are as hair grooming agents, protective films, bandages, antitarnish coatings and decorative sprays. Their film-forming and adhesive characteristics also suggest their application to adhesives, inks and protective coatings. Chemical data are given indicating the flexibility of these materials—variable in hygroscopicity and abrasion resistance—to suit particular requirements.

•

Engineering. (Vocational and Professional Monograph No. 14). By Edward H. Robie. Bellman Publishing Co., Cambridge 38, Mass. 6 x 9 in. 36 pp. $1.00.

This is one of a series of monographs intended to help individuals in the choice of a career and to supplement general counseling work. It was written by an expert in the field, recently retired as secretary emeritus of the American Institute of Mining, Metallurgical and Petroleum Engineers. The booklet contains a list of engineering schools in the U. S. that have one or more accredited curricula, broken down into six geographical areas, and the engineering enrollment of each institution. It also indexes professional organizations, trade publications and a bibliography of career material.

•

Atlas Hydraulic Presses. (Catalog No. 88). Atlas Hydraulics Div., Delaware Valley Mfg. Co., Inc., 3576 Ruth St., Philadelphia 34, Penna. 8½ x 11 in. 12 pp.

A new line of hydraulic presses for compression molding, transfer molding and laminating are illustrated in this catalog. Included are descriptions of 41 standard models for laboratory or production work. In addition, custom service is offered for construction of presses suitable for any other pressure type applications. They can be equipped with self-contained pumping units or designed for central plant operation.

THE CASE OF THE
Listening Lady
SOLVENT CONTAMINATION AND LATE DELIVERY HAVE COST US A 9% LOSS IN PRODUCTION . . . I'LL GIVE YOU ONE MORE CHANCE!!

EXCUSE ME, MR. JONES . . . I HAPPENED TO OVERHEAR THE BOSS, AND . . . WELL, I HAVE AN IDEA . . .
PURCHASING AGENT
. . . AND MY BROTHER SAID SWITCHING TO SKELLYSOLVE WAS THE ANSWER FOR THEM!!
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LATER
LOOK AT THESE FIGURES, JONES . . . PRODUCTION'S WAY UP!! HOW'D YOU DO IT?
. . . AND SINCE SKELLYSOLVE IS CONSTANTLY CHECKED DURING PRODUCTION AND BEFORE SHIPMENT NO MORE CONTAMINATION TROUBLES!
NINE OUT OF TEN CARS ARE SHIPPED THE DAY AFTER THE ORDER IS RECEIVED . . . AND THEIR TECHNICAL SERVICE IS BACKED BY OVER 25 YEARS EXPERIENCE!
NICE GOING, JONES!!
FLOWERS . . . FOR ME?
SURE, AND I'M RECOMMENDING YOU FOR A RAISE!! THANKS FOR TIPPING ME OFF TO SKELLYSOLVE!!

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SKELLYSOLVE-C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve-B. Closed cup flash point about 13°F.

SKELLYSOLVE-H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-C is desired. Closed cup flash point about -16°F.

SKELLYSOLVE-L. For general manufacturing operations where a medium evaporation rate is required. Closed cup flash point about 12°F.

SKELLYSOLVE-R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency. Closed cup flash point about -25°F.

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (December 1), the price of natural rubber on the New York Commodity Exchange has moved in a range of 325 points, high being 43.00c reached on December 1, and low being 39.75c reached on December 16. The average price of spot rubber for the month of December was 41.46c based on 22 trading days. This compares with an average of 45.16c in November, 1959.

Soviet Rubber Sale

Reports from London state that the Soviet Union is planning to sell about 45,000 long tons of rubber to Eastern European countries. Far Eastern dealers expect Russian selling to be spread over three months, from January through March. Each month's sales are expected to include some 15,000 tons.

Sales are expected to be made to Poland, Czechoslovakia, Bulgaria and Rumania. The Rumanian government has already canceled orders for rubber from London and has given as a reason the Russian decision to sell some rubber.

Many rubber dealers are of the opinion that Russia and Poland will halt purchases of Malayan rubber. Sources in the Far East said they had information that stocks of rubber held by Russia in Odessa have taken up all available warehouse space which explains why recent Soviet purchases of Malayan rubber were diverted to Leningrad.

Traders in New York decline to hazard a guess as to just what impact any big sale of Russian held rubber would have on the U.S. market. One trader made this observation, reports the *Wall Street Journal*: "If the rubber is released from the Russian stockpile, the market would be depressed. But if the rubber has been newly acquired from Malaya, Russia would be obliged to buy more and the market would not be materially affected."

Stockpile Supplies

Merrill Lynch, Pierce, Fenner & Smith points out that sales by both the U.S. and the United Kingdom of stockpile rubber were almost identical in October-November. GSA sales totaled 12,650 long tons, and the Board of Trade in London sold 12,467 long tons. The total of GSA rubber available from the stockpile is just over 74,000 long tons and further quantities may be added. However, actual sales for the period ending June 30, 1960, may not exceed the announced approximate 50,000 ton figure. Thus, the amount already sold in the first two months equates to one-third of what may yet be sold. It should be noted that the 50,000 long tons being sold this fiscal year is part of the 470,000 long tons being released under current law.

NEW YORK, JANUARY 4, 1960

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM DEC. 1 TO DEC. 31

Dec.	Spot	Jan.	Mar.	May	Sales
1	43.00	41.65	39.55	38.35	73
2	42.00	41.40	39.50	38.25	38
3	41.00	40.60	38.84	37.75	57
4	41.50	41.30	39.50	38.50	67
5	....	....	....	....	...
6	....	....	....	....	...
7	42.00	41.80	39.85	38.85	39
8	42.00	41.85	39.80	38.55	30
9	41.88	41.70	39.50	38.20	62
10	41.88	41.70	39.75	38.40	20
11	41.50	41.20	39.20	37.85	60
12	....	....	....	....	...
13	....	....	....	....	...
14	50.50	40.25	38.30	37.20	54
15	39.88	39.65	38.40	37.20	135
16	39.75	39.50	38.30	37.15	26
17	40.75	40.40	39.40	38.35	69
18	41.50	41.15	40.15	39.00	96
19	....	....	....	....	...
20	....	....	....	....	...
21	42.00	41.70	40.75	39.50	51
22	41.75	41.50	40.30	39.00	61
23	42.00	41.80	40.40	39.10	10
24	41.75	41.50	39.90	38.70	23
25	....	....	....	....	...
26	....	....	....	....	...
27	....	....	....	....	...
28	41.75	41.50	40.00	38.50	61
29	41.00	40.80	39.20	37.75	61
30	41.25	41.10	39.60	38.00	36
31	41.50	41.40	39.63	38.10	15

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.41½
Mar.	.39⅞
Apr.-June	.38½
Thin Latex Crepe:	
Spot	.47¼
Thin Brown Crepe, No. 2	.41¾
Flat Bark Crepe	.37½

London Market
(Standard Smoked Sheets)

Mar.	37.93 — 38.22
Apr.-June	37.05 — 37.34

Singapore Market
(Standard Smoked Sheets)

Jan.	36.63 — 36.67

Middling Upland Quotation

	Nov. 30	December 31		
	Close	High	Low	Close
Mar.	32.88	33.10	33.07	33.08
May	33.11	33.32	33.26	33.26
July	32.80	33.28	33.18	33.21

Notes & Quotes

E. J. Thomas, chairman of the board of the Goodyear Tire & Rubber Co., in an annual statement, states that auto tire replacement sales are expected to total 68 million in 1960, setting a new record high for the fourth straight year. Sales of passenger car tires in the U.S. replacement market will reach the 66 million level in 1959, compared with 61.5 million in 1958 and 56.6 million in 1957. Mr. Thomas estimates that truck tire replacement sales will reach 9.8 million units in 1959, when all the figures are in.

Synthetic Rubber

By all accounts, the outlook for the synthetic rubber industry in 1960 and the years that lie ahead is rosy indeed. It is now known that 1,055,000 long tons of all types of synthetic rubber were consumed in 1959, some 175,000 long tons more than were consumed in the previous year.

In 1958, synthetic rubber accounted for 64.5 per cent of all the new rubber consumed, while in 1959 the synthetic preference ratio stood at 65.5 per cent. The most knowledgeable estimates place the synthetic preference ratio in 1960 at 66 per cent. Total new rubber consumption in 1960 is estimated at 1,630,000 long tons.

Natural Use Restricted

George R. Vila, group executive vice-president of the U.S. Rubber Co., speaking before the recent meeting of the American Management Association in New York City, pointed out that in 1960 the choice of materials available to the rubber processor will be restricted by conditions peculiar to the rubber industry.

The amount of natural rubber available to U.S. users is expected to be held to about 550,000 long tons due to intense competition for supplies by a resurgent European industry and the Iron Curtain countries, working against an inflexible world supply of about 2,000,000 long tons yearly.

Consequently, in 1960, the general purpose type of synthetic rubber is expected to encounter the highest demands in terms of absolute tons in its peacetime history. Operations should be up to 80 per cent of effective capacity, Mr. Vila said, the best annual rate since industry took over the plants from the U.S. government in 1955.

Mr. Vila went on to say that demand is also expected to increase for the specialty synthetic rubbers such as nitrile, neoprene and butyl. New markets have been opening up for these materials as rubber technology has advanced.

Newer Types Reach Production

Industry's newest synthetic rubbers such as polyisoprene and polybutadiene, are expected to move into the initial phases of commercial production during 1960, Mr. Vila declared. These types of synthetic rubber, similar in properties to natural rubber, will find a ready market in the truck and bus tire field.

In all, it may safely be said that the synthetic rubber industry approaches the new decade in an enviable position. Technological developments occuring within the next ten years may further solidify the position the material now holds. Some thought will soon have to be given to increasing capacity. The problem will then be to determine which types will be in the greatest demand in the period to come.

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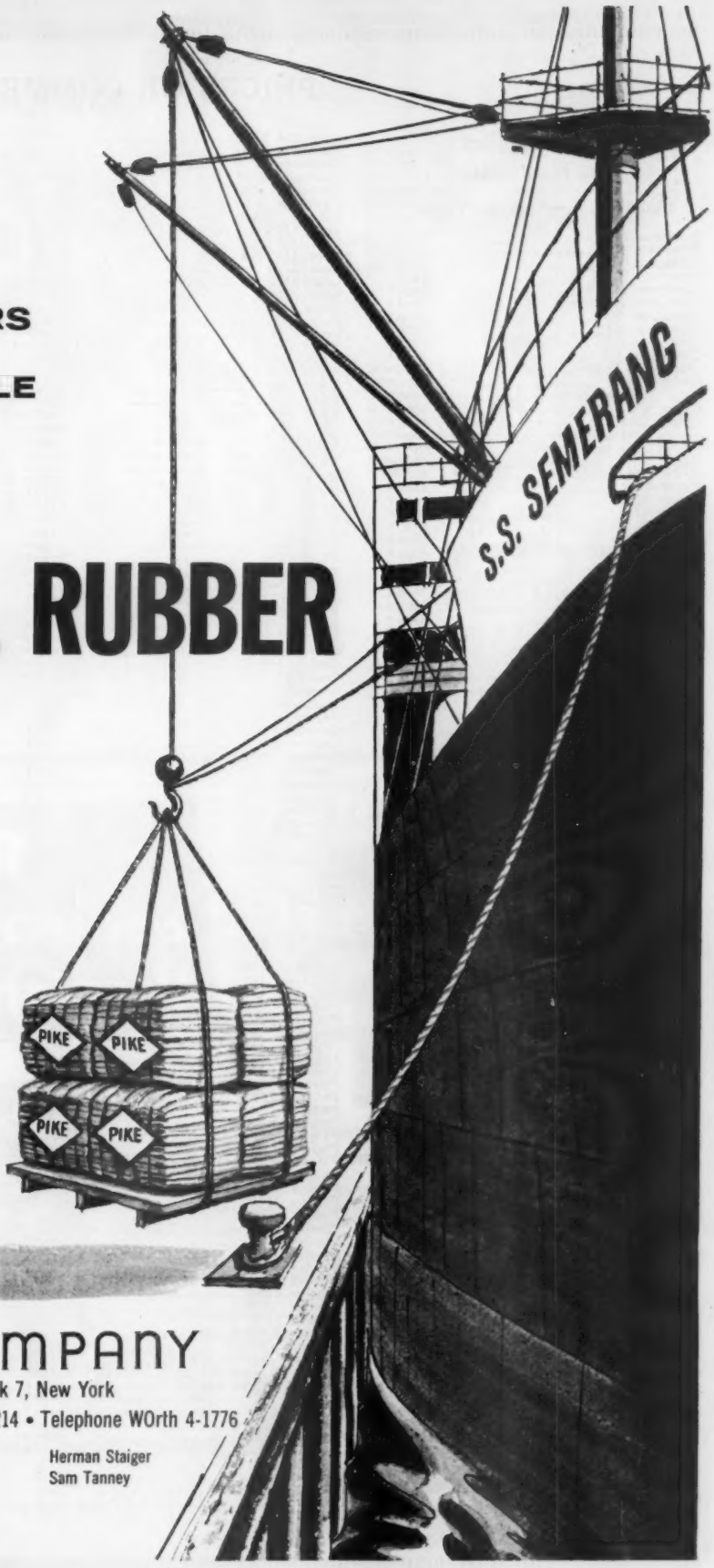

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PRICES OF COMMERCIALLY AVAILABLE

Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900
Butaprene NH	.6500
Butaprene NL	.5000
Butaprene NXM	.5800
Chemigum N1NS	.6400
Chemigum N3NS and N5	.5800
Chemigum N6	.5000
Chemigum N6B	.5000
Chemigum N7	.5000
Chemigum N8	.5000
Chemigum N600	.5000
Herecol N-33	.6800
Hycar 1001 and 1041	.5800
Hycar 1002	.5000
Hycar 1014	.6000
Hycar 1042 and 1043	.5000
Hycar 1051	.5800
Hycar 1052	.5000
Hycar 1053	.5000
Hycar 1072	.6400
Hycar 1203	.4600
Hycar 1312	.5000
Hycar 1411	.6200
Hycar 1432	.5900
Hycar 1441	.6200
Paracril AJ	.4850
Paracril B and BJ	.5000
Paracril BLT and BJLT	.5000
Paracril C and CLT	.5800
Paracril CV	.5900
Paracril D	.6500
Paracril 18-80	.6000
Paracril OZO	.4600
Polysar Krynac 800	.5000
Polysar Krynac 801	.5800
Polysar Krynac 802	.5000
Polysar Krynac 803	.5000

Butadiene-Styrene Types

Ameripol 1000	.2410
Ameripol 1001	.2410
Ameripol 1002	.2435
Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2410
Ameripol 1013 (crumb)	.2615
Ameripol 1500 and 1501	.2410
Ameripol 1502	.2410
Ameripol 1703	.2060
Ameripol 1705	.2035
Ameripol 1707	.1910
Ameripol 1708	.1910
Ameripol 1710	.1885
Ameripol 1712	.1885
Ameripol 1805	.1550
Ameripol 4600	.2410
Ameripol 4650	.1820
Ameripol 4651	.1770
Ameripol 4652	.1425
Ameripol 4654	.1870
Ameripol 4655	.1820
Ameripol 4700	.1750
Ameripol 4750	.1545
Ameripol 4751	.1400
Ameripol 4752	.1600
Ameripol 4753	.1480
ASRC 1000	.2410
ASRC 1001 and 1004	.2410
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500	.2410
ASRC 1502	.2410
ASRC 1503	.2625
ASRC 1703	.2060
ASRC 1708	.1910
ASRC 1712	.1885
ASRC 1713	.1750
TSRC 3105 and 3106	.2410
ASRC 3110	.2600
Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1801	.1760
Baytown 1803	.1740
C-102 (Shell)	.2300
Carbomix 3750	.1820
Carbomix 3751	.1545
Carbomix 3752	.1845
Carbomix 3753	.1640
Carbomix 3756	.1569
Carbomix 3757	.1480
Carbomix 3758	.1545
Carbomix 3760	.1496
CB-102 (Shell)	.1850
Copo 1500	.2410
Copo 1502	.2410
Copo 1505-NS	.2610
Copo 1712	.1885
Copo 1773	.2060
Copo 1778	.1910
Copo 3700	.1725
Copo 3701	.1750
Copo 3900	.2310
FR-S 146	.2410
FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 181	.2410
FR-S 182	.2410
FR-S 184	.1885
FR-S 1000	.2410
FR-S 1001	.1410
FR-S 1004	.2410
FR-S 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2410
FR-S 1014	.2810
FR-S 1500	.2410
FR-S 1502	.2410
FR-S 1703	.2060
FR-S 1710	.1885
FR-S 1712	.1885
Gentro 1500	.2410
Gentro 1712	.1885
Gentro-Jet 9152	.2080
Gentro-Jet 9153	.1820
Gentro-Jet 9154	.1845
Gentro-Jet 9250	.1580
Gentro-Jet 9251	.1640
Gentro-Jet 9252	.1670
Gentro-Jet 9275	.1500
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1022	.2950
Naugapol 1023	.3150
Naugapol 1503	.2625
Naugapol 1504	.0330
Naugapol 6003	.2700
Naugapol 6100	.3100
OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113C (Shell)	.1750
OB-114C (Shell)	.1420
Philprene 1000	.2410
Philprene 1001	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1500	.2410
Philprene 1502	.2410
Philprene 1503	.2625
Philprene 1601	.1930
Philprene 1603	.1940
Philprene 1605	.1900
Philprene 1703	.2060
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Philprene 1805	.1550
Plioflex 1006	.2410
Plioflex 1500C	.2410
Plioflex 1502	.2410
Plioflex 1507	.2410
Plioflex 1703	.2060
Plioflex 1710C	.1885
Plioflex 1712C	.1885
Plioflex 1713	.1750
Plioflex 1714C	.1725
Plioflex 1773	.2060
Plioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Krylene	.2410
Polysar Krylene NS	.2410
Polysar Krynol 651	.1885
Polysar Krynol 652	.1910
Polysar S	.2410
Polysar S-50	.2410
Polysar S-X 371	.2550
Polysar SS-250	.2875
S-1000	.2300
S-1002	.2325
S-1006	.2300
S-1009	.2400
S-1011	.2325
S-1013	.2300
S-1500	.2300
S-1502	.2300
S-1509	.2300
S-1600	.1825
S-1602	.1825
S-1605	.1800
S-1703	.1950
S-1707	.1800
S-1709	.1775
S-1710	.1775
S-1712	.1775
S-1803	.1650
S-1804	.1750
S-7701	.1850
SP-103 (Shell)	.2900
Synpol 1000	.2410
Synpol 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1061	.2410
Synpol 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707	.1910
Synpol 1708	.1910
Synpol 1711	.1900
Synpol 1712	.1885
Synpol 8000	.2410
Synpol 8150	.1930
Synpol 8200	.1910
Synpol 8201	.1750
Synpol 8250	.1740
Synpol 8253	.1584
Synpol 8254	.1545
Synpol X-274	.2550

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215	.2300
Enjay Butyl 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Polysar Butyl 100	.2450
Polysar Butyl 101	.2775
Polysar Butyl 200 and 300	.2450
Polysar Butyl 301	.2550
Polysar Butyl 400	.2450

Chlorosulfonated Polyethylene

Hypalon 20	.7000
Hypalon 30	.7000

Fluoroelastomers

Kel-F Fluorel	$15.00
Kel-F 3700	$16.00
Kel-F 5500	$16.00
Viton A	$10.00
Viton A-HV	$10.00
Viton B	$13.00

Neoprene

	(prices f.o.b.)
Neoprene Types AC and CG	.5500
Neoprene Type AD	.5500
Neoprene Type FB	.6500
Neoprene Type GN	.4100
Neoprene Type GN-A	.4100
Neoprene Type GRT	.4200
Neoprene Type KNR	.7500
Neoprene Type S	.4200
Neoprene Type W	.3900
Neoprene Type WB	.4100
Neoprene Type WHV	.3900
Neoprene Type WRT	.4500
Neoprene Type WX	.4100

Polysulfide Rubbers

	(prices f.o.b.)
Thiokol Type A	.5000
Thiokol Type FA	.6900
Thiokol Type ST	1.2500

Silicone Rubbers*

	(prices f.o.b.)
GE (compounded)	2.50
GE Silicone Gum (not compounded)	4.00
Silastic (compounded)	2.50
Silastic (gums)	4.00
Union Carbide (gums)	4.00
Union Carbide (compounds)	2.50

SYNTHETIC RUBBER POLYMERS

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600	1
Butaprene N-400 and N-401	.5400	1
Chemigum 200	.4900	3
Chemigum 235 and 236	.5400	3
Chemigum 245	.4600	3
Chemigum 246	.4600	3
Chemigum 247	.4600	3
Chemigum 248	.4600	3
Hycar 1512	.4500	3
Hycar 1551	.5300	3
Hycar 1552	.4500	3
Hycar 1561	.5300	3
Hycar 1562	.4500	3
Hycar 1571	.5300	3
Hycar 1572	.4500	3
Hycar 1577	.4500	3
Tylac 640	.4500	1
Tylac 740	.4900	1
Tylac 840	.5300	1
Tylac 1640	.5400	1
Tylac 2241	.5300	1
Tylac 2430	.5000	1
Tylac 2570	.5300	1
Tylac 2830	.4500	1

Butadiene-Styrene Types

CL-101 (Shell)	.2800	3
Copo 2000	.2775	3
Copo 2101	.3000	3
Copo 2102	.3200	3
Copo 2105	.3200	3
Copo 2108	.3000	3
Copo 2109	.2775	3
Copo 2110	.3200	3
Copo 3852	.2900	3
FR-S 110	.3000	3
FR-S 150	.3000	3
FR-S 151	.2900	3
FR-S 174	.2950	3
FR-S 176	.2775	3
FR-S 2000	.2775	3
FR-S 2001	.2775	3
FR-S 2002	.3000	3
FR-S 2003	.3050	3
FR-S 2004	.3050	3
FR-S 2006	.2900	3
FR-S 2105	.3200	3
Naugatex 2000	.3375	1
Naugatex 2001	.3375	1
Naugatex 2002	.3500	1
Naugatex 2006	.3900	1
Naugatex 2105	.3600	1
Naugatex 2107	.3600	1
Naugatex 2108	.3600	1
Naugatex 2113	.3400	1
Naugatex J-8174	.3600	1
Naugatex J-8535	.3500	1
Nitrex 2612	.5000	1
Nitrex 2614	.4600	1
Nitrex 2614-A	.4600	1
Nitrex 2615	.5100	1
Nitrex 2615-A	.5100	1
Nitrex 2616	.5800	1
Nitrex 2617	.4600	1
Nitrex 2617-A	.4600	1
Nitrex 2619	.5700	1
Nitrex 2620	.5000	1
Nitrex 2625	.5000	1
Nitrex 2625-A	.5000	1
Nitrex J-6849	.5400	1
Pliolite 2000	.2775	3
Pliolite 2001	.2775	3
Pliolite 2076	.2900	3
Pliolite 2104	.3200	3
Pliolite 2105	.3200	3
Pliolite 2107	.3200	3
Pliolite 2108	.3000	3
S-2000 and S-2006	.2600	3
S-2101	.2600	3
S-2105	.2800	3
S-2108	.2900	3

Neoprene

Neoprene Latex 60	.4000	3
Neoprene Latex 571	.3700	3
Neoprene Latex 572	.3900	3
Neoprene Latex 601-A	.4000	3
Neoprene Latex 673	.5000	3
Neoprene Latex 735	.3800	3
Neoprene Latex 736	.3800	3
Neoprene Latex 842-A	.3700	3
Neoprene Latex 950	.4700	3

Polysulfide Rubbers

Thiokol Type MX	.8000	3
Thiokol Type WD-2	1.2500	3
Thiokol Type WD-6	.8000	3

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

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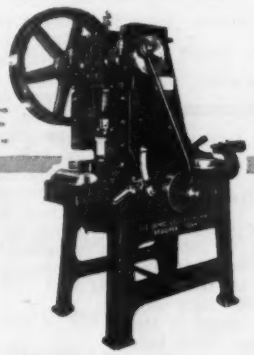
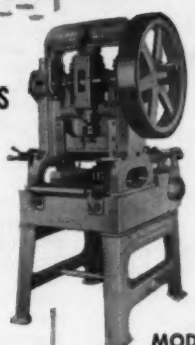


MODEL A1
Precision cutting for both high speed production or short runs.

PRECISION RUBBER CUTTING MACHINES CUT WITH OR ACROSS STOCK GRAIN

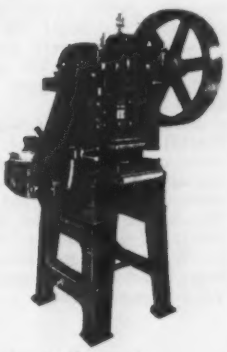
- Peak production loads
- Short runs
- Multiple heels and taps
- Half and full soles
- Mechanical rubber goods



A COULTER Rubber Cutter saves in 2 most important ways

First, you enjoy greater production with cutting speeds at rates up to 15,000 pieces per hour.

Second, lower maintenance; Coulter rubber cutters are job-designed to last longer and to cut at top efficiency for year-after-year of trouble-free service.



MODEL A2
Precision cutting for multiple heels, half and full soles with stock grain.

MODEL A3
Precision cutting of multiple heels and taps with or across stock grain.

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BRIDGEPORT, CONN.

Recognized and respected throughout the entire world for 63 years.

See your local distributor or write today for full information.

MARKETS

(continued)

Reclaimed Rubber

Pending final recapitulation, it is now estimated that 290,000 long tons of reclaimed rubber were consumed in the United States in 1959. This consumption came in the face of estimates at this time last year that reclaimed rubber would not do nearly so well. Most persons in the industry are now agreed that reclaim consumption in 1960 will be at or close to the 300,000 long ton mark.

The last time reclaimed rubber consumption topped 300,000 long tons was in 1955 when something over 312,000 long tons were consumed. It should be remembered, however, that in 1955, U.S. consumption of new rubber totaled something over 1.5 million long tons, while in 1959, total new rubber consumption was in the order of 1.62 million long tons.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

While the scrap rubber market was beset by many problems in the year just ended, it, too, did better than was expected earlier in the year. It is now estimated that some 300,000 long tons of scrap rubber were consumed in the United States in 1959 and 1960 bids fair to top that figure if only by a small amount.

Slower trading has been noted in the market during the past few weeks as reclaimers limited their purchases with the approach of year end and the inventory taking period. Accelerated automobile production in prospect for the first few months of 1960 should do much to stimulate reclaim production and, thereby, scrap consumption. Scrap prices remain steady.

(Prices Delivered Akron)

Mixed tires	ton	15.00
Light colored carcass	lb.	.05
No. 1 peelings	ton	40.00
No. 2 peelings	ton	28.00
No. 3 peelings	ton	23.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	22.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07¼
Natural Rubber Black Tubes	lb.	.06½
Butyl Rubber Tubes	lb.	.06¾

Tire Fabrics

Producers of high-strength rayon tire yarn have announced price cuts averaging 8 to 9 per cent in a move to counter earlier cuts in nylon yarn prices. Despite the latest reductions, however, there are indications that still another cut in nylon prices may be in the works. The latest series of price cuts leaves nylon still in the same approximate position to rayon in terms of daily use by tire companies.

One rubber company official, as reported in the *Wall Street Journal*, predicted that nylon producers will probably make another cut in tire cord prices and may be able to get their product on a par with Tyrex. The rubber company official said that rayon companies are getting very close to the floor set under their prices by costs, while nylon companies still have room to move.

Trade sources believe that the latest price cuts reduce the spread between nylon and rayon yarns. This may have greater importance to some tire manufacturers in terms of inventory costs than in direct production costs. Mohawk Rubber Co., for example, dropped rayon last fall and went to nylon cord exclusively because of the savings in inventory costs of stocking only one material and only one tire. It is reported that some larger companies are toying with this idea for truck tires.

No Lower Prices

The trade is generally agreed that lower prices on nylon and rayon cord will have no effect upon ultimate tire prices. Even if nylon succeeds in penetrating the original equipment tire market, this will not mean lower tire prices.

Some in the industry believe that the new lower prices for nylon will mean the end of rayon in the truck tire field. The bulk of these tires are already made with nylon, but they sell at a premium price.

Thus, the new year has begun with a "bang" in the tire cord market. It now remains to be seen if any startling new developments will occur in 1960.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.62½
1650	lb.	.62
2200	lb.	.62½

Nylon Tire Cord

210	lb.	1.75
840	lb.	1.47

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9	oz. (per square yard)	lb.	.74
9.25	oz. (per square yard)	lb.	.71
11.65	oz. (per square yard)	lb.	.65
14.4	oz. (per square yard)	lb.	.74

Liquid Latex

Natural: Final figures on the consumption of natural rubber latex in 1959 should indicate that close to 73,000 long tons were consumed. A total of 66,521 long tons of natural latex were consumed in the January through November, 1959, period, or something more than 6,000 long tons a month.

The 73,000 long tons of natural latex will be some 5,000 more than in 1958, and some 13,000 long tons less than in the peak year of 1955. Still, in balance, 1959 consumption was rather good, more so in consideration of the fact that prices during the year were generally in excess of 40c per pound. Prices at the moment are about 45 to 46c per pound in car load lots at East Coast ports.

Market prices of natural rubber latex are still subject to a great many factors not under its own control, such as the political situation in the Far East. However, given a minimum of stability, natural rubber latex should enjoy, in 1960, at least as good a year as it experienced in 1959.

Synthetic: On the basis of eleven-month figures, it now appears as if something in the order of 105,000 long tons of all types of synthetic rubber latex will have been consumed in 1959. This figure, if verified, will be some 25,000 long tons more than in the previous year and will represent a new all-time record.

What with predictions for increased consumption of rubber in 1960, it would seem that synthetic rubber latex can go nowhere but up. The future for this segment of the rubber industry seems bright indeed.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in the extremely narrow range of 35 points since our last report, high being 33.20c reached on December 15, and low being 32.85c reached on December 1 and on seven other days during the period. The average price of middling uplands for the month of December was 33.02c based on 22 trading days. This compares with an average of 32.79c in the previous month.

Preliminary returns indicate that growers of both upland and extra staple cotton have approved marketing quotas for the 1960 crops in referendums held by the U.S. Department of Agriculture. Since quotas on both types of cotton have been approved by more than the necessary two-thirds of the growers voting, marketing quotas will continue in effect for 1960 crops.

Growers who exceed their applicable acreage allotments are subject to penalties on excess production. Not later than January 31, 1960, Secretary of Agriculture Benson will determine the levels of price support for the 1960 upland cotton crop.

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STATISTICS of the industry

PERTINENT INDUSTRY DATA

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20,937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	495,500	11,391	303,000
1936	488,145	575,000	12,582	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,543
1955	635,174	634,800	10,611	110,105
1956	580,510	563,095	11,300	115,949
1957	499,121	539,761	10,146	100,901
1958	474,409	484,492	20,085	76,491
1958:				
Dec.	57,067	46,600	2,000	75,325
1959:				
Jan.	54,950	49,913	1,438	82,487
Feb.	48,917	47,345	1,561	79,657
Mar.	48,584	51,991	2,131	78,871
Apr.	34,828	40,850	1,700	78,900
May	45,451	38,777	1,967	82,983
June	45,111	48,570	2,350	85,010
July	47,527	47,545	1,323	80,059
Aug.	46,453	46,914	1,650	80,106
Sept.	41,420	49,582	1,480	76,935
Oct.	46,087	49,049	1,100	74,172
Nov.	42,025	42,180	1,200	81,570

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry: Long Tons	Dry: Declared Value	Latex: Long Tons	Latex: Declared Value	Total Imports
1936	467,064	152,072,496	19,852	6,659,899	486,916
1937	574,600	237,307,041	23,185	10,213,670	597,785
1938	397,640	125,373,864	11,944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	322,364	219,098,143	74,483	42,755,029	596,847
1955	342,507	360,435,303	92,825	80,163,114	635,332
1956	499,479	334,990,045	71,709	61,795,844	564,321
1957	475,958	291,337,628	78,567	58,249,788	554,174
1958	406,059	153,127,066	67,593	45,047,040	473,652
1959:					
Apr.	38,005	21,869,881	6,342	4,372,505	44,347
May	39,444	23,371,117	6,006	4,990,906	45,450
June	43,067	23,474,991	7,445	5,635,689	50,512
July	42,058	27,606,695	5,469	4,524,071	47,527
Aug.	38,228	26,533,930	7,131	5,487,070	45,359
Sept.	40,696	29,259,772	6,947	5,698,625	47,643
Oct.	41,631	31,108,534	6,747	5,612,350	48,378

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America*	Rest of World*	Total*
1947	646,362	277,951	89,000	38,128	34,928	172,782	1,260,000
1948	698,189	432,349	95,000	43,935	29,158	225,557	1,525,000
1949	671,503	432,996	89,500	43,010	27,318	225,659	1,490,000
1950	694,090	696,472	113,500	48,482	26,902	280,299	1,860,000
1951	605,346	814,406	105,000	52,136	29,777	278,262	1,885,000
1952	584,238	750,494	96,500	63,134	35,475	261,211	1,790,000
1953	574,390	692,164	98,610	74,545	35,318	250,182	1,725,000
1954	584,435	738,670	93,935	78,024	26,833	280,112	1,802,500
1955	639,128	733,786	93,830	80,172	6,000	344,584	1,897,500
1956	568,550	686,667	95,389	89,072	22,457	336,015	1,857,000
1957	638,706	684,515	98,164	58,440	28,351	381,824	1,890,000
1958	663,644	614,561	100,196	103,613	26,268	446,718	1,955,000
1959:							
Mar.	49,631	57,626	4,375	2,656	2,906	35,306	152,500
Apr.	48,338	60,436	6,260	5,988	3,016	30,962	155,000
May	55,893	67,362	6,477	8,334	2,826	31,608	172,500
June	58,206	68,457	4,972	8,711	1,373	23,281	165,000
July	62,544	54,791	7,175	9,300	600	43,090	177,500
Aug.	61,426	61,902	8,926	8,836	600	35,810	177,500
Sept.	61,810	56,340	8,197	3,140	600	39,913	170,000

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2,335,000
1953	1,338,309	211,453	73,394	521,000	343,606	2,500,000
1954	1,233,012	247,612	71,656	544,250	408,094	2,505,000
1955	1,529,699	266,804	84,528	630,000	464,250	2,980,000
1956	1,436,482	232,345	91,458	775,500	489,215	3,025,000
1957	1,464,640	239,021	88,379	777,250	565,710	3,135,000
1958	1,364,404	238,439	83,904	905,000	638,353	3,230,000
1959:						
Mar.	147,080	21,967	8,535	64,750	52,668	295,000
Apr.	121,222	20,163	8,819	87,000	52,796	290,000
May	113,392	19,851	8,518	86,500	51,739	280,000
June	139,481	26,394	9,752	90,000	59,373	325,000
July	141,279	18,393	7,990	76,750	55,588	300,000
Aug.	137,951	15,426	6,387	57,500	50,236	267,500

Source: International Rubber Study Group. * Estimated.

Rim Production

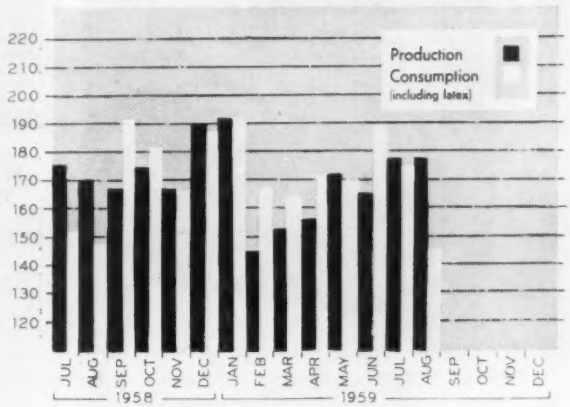
	1954	1955	1956	1957	1958
Passenger Car	25,952,322	38,092,080	27,109,610	27,301,567	20,665,688
Truck & Bus	4,463,689	6,642,329	6,315,428	5,468,223	3,887,910
Agricultural	1,279,040	1,931,768	1,416,938	1,368,127	1,218,240
Earth Mover	21,536	38,849	88,812	67,289	61,883
Total	31,734,587	46,705,036	34,930,788	34,205,206	25,833,721

	1959					
	June	July	Aug.	Sept.	Oct.	Nov.
Passenger Car	2,660,094	1,816,678	1,413,466	1,760,810	1,872,647	1,117,817
Truck and Bus	512,843	449,744	356,554	328,918	225,625	183,752
Agricultural	188,060	74,252	106,041	98,625	74,174	79,419
Earth Mover	13,070	6,419	14,686	3,186	11,648	1,350
Total	3,374,067	2,347,093	1,890,747	2,191,539	2,184,094	1,382,338

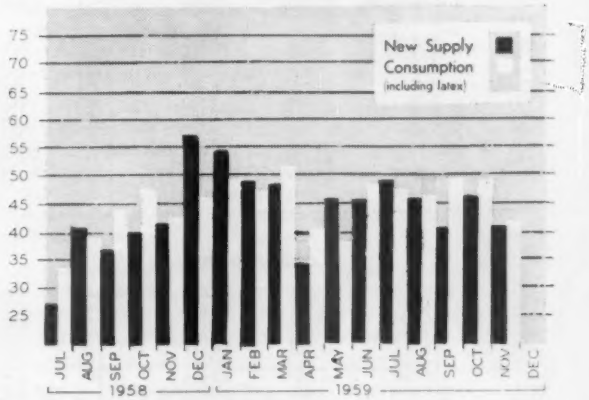
Source: The Tire & Rim Association, Inc.

STATISTICS at a glance

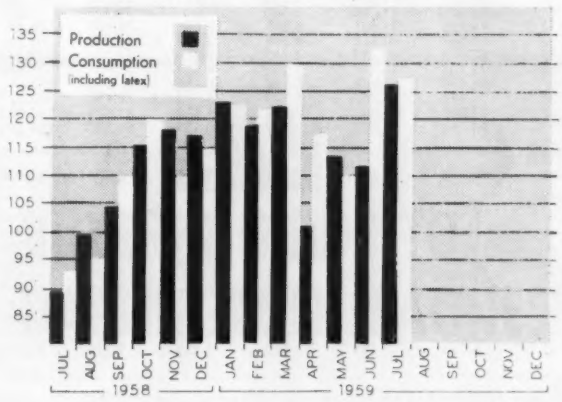
NATURAL RUBBER—WORLD
(thousands of long tons)



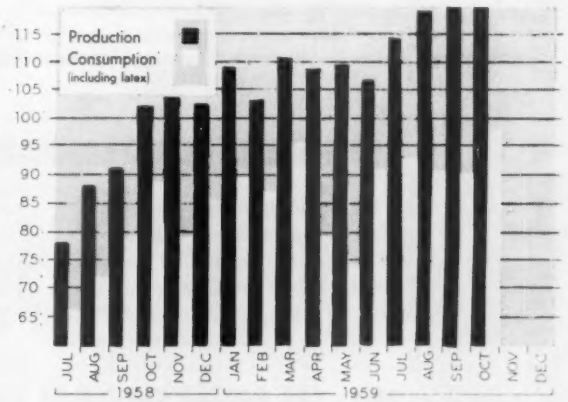
NATURAL RUBBER—UNITED STATES
(thousands of long tons)



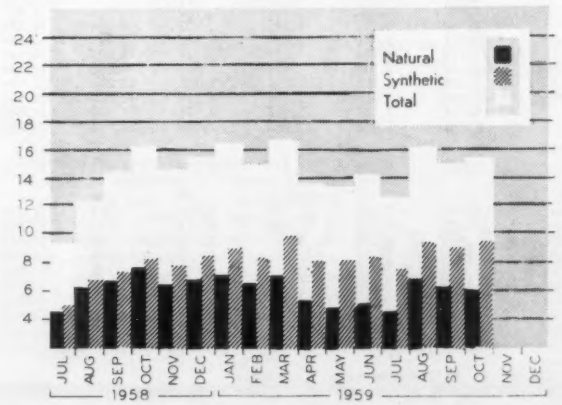
SYNTHETIC RUBBER—WORLD
(thousands of long tons)



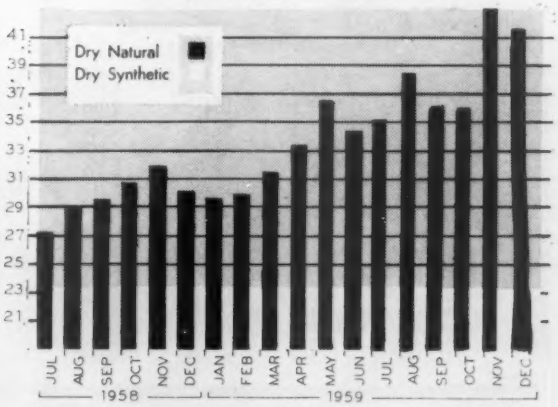
SYNTHETIC RUBBER—UNITED STATES
(thousands of long tons)



LATEX CONSUMPTION—UNITED STATES
(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC
(cents per pound)



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1949	310,599	35,215	34,046	11,072	410,932
1950	378,887	50,067	60,915	12,037	501,906
1951	704,529	58,907	76,475	15,333	855,244
1952	654,854	65,745	81,630	16,228	818,447
1953	680,728	80,495	79,801	20,198	861,222
1954	490,405	69,150	58,802	21,396	639,753
1955	801,145	91,357	56,179	32,623	982,304
1956	876,982	99,412	75,873	34,547	1,086,814
1957	913,321	110,721	67,418	33,618	1,125,078
1958	872,565	97,806	54,113	32,431	1,056,915
1959:					
Jan.	90,622	9,991	5,305	3,304	109,222
Feb.	83,662	10,256	5,898	3,407	103,223
Mar.	92,315	9,690	6,226	3,818	112,049
Apr.	88,509	10,455	6,301	3,324	108,589
May	89,625	10,249	6,470	3,617	109,961
June	87,226	10,216	5,590	3,707	106,739
July	95,207	9,365	6,420	3,843	114,835
Aug.	97,494	10,471	8,179	3,451	..119,545
Sept.	98,117	10,888	7,717	3,940	120,662
Oct.	106,643	10,099	7,957	3,833	128,532

Consumption

1950	416,230	43,781	66,348	11,930	538,289
1951	626,444	48,887	70,500	13,066	758,897
1952	666,420	55,522	71,229	13,866	807,037
1953	624,181	65,900	77,826	16,929	784,836
1954	500,345	57,203	61,464	17,715	636,727
1955	741,997	72,876	53,991	26,035	894,899
1956	727,789	74,887	49,615	24,976	877,267
1957	767,218	75,461	55,413	25,187	923,279
1958:	730,196	69,694	53,432	26,590	880,912
1959:					
Jan.	74,222	7,198	5,359	2,857	89,636
Feb.	72,558	6,885	5,256	2,694	87,393
Mar.	78,792	7,444	5,687	3,166	95,089
Apr.	64,547	7,493	4,758	2,941	79,739
May	60,870	6,914	3,978	2,853	74,615
June	76,065	7,083	5,484	3,063	91,695
July	78,995	6,277	6,043	2,419	93,734
Aug.	75,340	7,117	5,533	3,047	91,037
Sept.	79,835	7,326	6,579	3,119	90,859
Oct.	81,963	7,538	5,965	3,128	98,594

Exports

1950	900	4,826	31	1,895	7,652
1951	483	6,825	216	1,725	9,249
1952	9,467	9,813	126	2,695	22,101
1953	7,692	11,494	237	3,245	22,668
1954	11,069	12,062	2,831	4,155	30,117
1955	60,704	18,098	9,895	4,593	93,290
1956	112,366	21,909	8,699	6,194	149,168
1957	157,977	30,242	8,748	6,377	203,344
1958	142,069	31,337	13,793	6,718	193,917
1959:					
Jan.	11,962	3,430	1,579	520	17,491
Feb.	11,615	2,404	1,169	648	15,836
Mar.	16,295	2,712	2,238	467	21,712
Apr.	19,154	3,741	2,135	527	25,557
May	12,281	2,942	2,587	642	18,452
June	21,871	2,522	2,386	937	27,716
July	19,814	4,105	1,580	440	25,939
Aug.	18,054	2,557	1,896	1,025	23,532
Sept.	22,506	4,864	2,240	692	30,302

Stocks

1949	77,731	4,654	12,224	3,433	98,042
1950	36,942	5,733	7,243	2,840	52,758
1951	105,271	8,379	12,481	3,821	129,912
1952	83,861	8,535	22,716	3,875	118,987
1953	135,153	11,480	24,866	4,346	175,845
1954	115,499	11,349	19,267	4,280	150,395
1955	108,989	12,220	10,500	6,030	137,739
1956	151,763	14,077	28,744	7,934	202,518
1957	140,199	18,843	31,489	7,454	197,985
1958	143,533	15,688	18,770	7,292	185,283
1959:					
Mar.	146,971	14,701	14,441	7,753	183,866
Apr.	147,867	14,848	12,496	7,728	182,939
May	156,209	15,024	12,710	7,820	191,763
June	145,486	14,986	11,128	7,969	179,569
July	142,606	15,187	9,899	8,912	176,604
Aug.	148,795	15,745	10,558	8,418	183,516
Sept.	147,400	12,845	9,535	8,526	178,306
Oct.	157,768	13,385	10,805	8,649	190,607

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	.....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	.....	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1955	92,754	69,364	10,432	10,798	90,594	183,348
1956	72,013	69,720	10,642	10,650	91,012	163,025
1957	72,252	74,535	10,403	11,420	96,358	168,610
1958	67,591	65,669	10,679	11,560	87,908	155,499
1958:						
Dec.	7,950	6,891	986	1,033	8,910	16,860
1959:						
Jan.	8,574	7,801	1,049	1,104	9,954	18,528
Feb.	5,746	7,578	998	1,161	9,737	15,483
Mar.	7,039	8,587	1,013	1,269	10,869	17,908
Apr.	6,342	6,730	1,301	911	8,942	15,284
May	6,007	6,583	1,146	1,156	8,885	14,892
June	7,445	6,730	1,223	1,196	9,149	16,594
July	5,469	6,871	956	1,279	9,106	14,575
Aug.	7,131	8,225	1,242	1,258	10,725	17,856
Sept.	6,947	8,201	956	1,364	10,521	17,468
Oct.	7,417	9,424	1,020	1,187	11,631	19,048

Consumption[1]

1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,368	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954	75,931	44,173	7,251	4,507	55,931	131,862
1955	86,478	63,982	8,736	8,495	81,213	167,691
1956	74,082	62,762	8,708	8,021	79,491	153,573
1957	75,009	68,305	9,039	8,630	85,974	160,983
1958	70,183	60,283	9,555	10,549	80,387	150,570
1958:						
Dec.	6,748	6,893	854	1,081	8,828	15,576
1959:						
Jan.	7,184	6,886	925	1,244	9,055	16,239
Feb.	6,489	7,083	859	1,009	8,951	15,440
Mar.	7,052	7,275	1,054	1,208	9,537	16,589
Apr.	5,793	5,629	1,104	1,169	7,902	13,695
May	5,429	5,962	995	1,112	8,069	13,498
June	5,622	6,497	910	1,150	8,557	14,179
July	5,004	5,804	919	940	7,663	12,667
Aug.	6,613	7,348	961	1,116	9,425	16,038
Sept.	6,342	6,919	910	1,178	9,007	15,349
Oct.	6,153	7,388	969	1,158	9,515	15,668

Stocks at End of Period

1945	3,121	....	....	....	....	3,121
1946	4,865	....	....	....	....	4,865
1947	5,033	....	....	....	....	5,033
1948	11,235	....	....	....	....	11,235
1949	5,063	....	....	....	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954	11,133	5,134	1,087	811	7,032	18,165
1955	13,203	6,980	1,236	1,807	10,203	23,406
1956	12,064	7,451	1,384	1,558	10,393	22,457
1957	14,454	8,347	1,267	1,974	11,588	26,042
1958	8,900	7,672	1,663	2,519	11,854	20,754
1958:						
Dec.	8,900	7,672	1,663	2,519	11,854	20,754
1959:						
Jan.	10,025	7,822	1,551	2,418	11,791	21,816
Feb.	10,482	7,753	1,488	2,535	11,776	22,258
Mar.	9,375	8,209	1,441	2,670	12,320	21,695
Apr.	8,599	7,859	1,458	2,379	11,696	20,295
May	9,718	7,917	1,417	2,398	11,732	21,450
June	11,063	7,314	1,601	2,432	11,347	22,410
July	10,752	6,983	1,528	2,761	11,272	22,024
Aug.	11,472	6,775	1,576	2,779	11,130	22,602
Sept.	11,742	7,196	1,498	2,810	11,504	23,246
Oct.	12,220	7,570	1,464	2,888	11,922	24,142

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

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DARLINGTON

MAGNESIUM OXIDE
MAGNESIUM CARBONATE
MAGNESIUM HYDROXIDE

Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1951 (total)	32,153	44,612	1,677	78,442	83,405	8,765
Passenger Car.	26,729	34,226	723	61,678	65,546	6,973
Truck and Bus	5,424	10,386	954	16,764	17,859	1,791
1952 (total)	29,484	54,342	1,520	85,346	90,411	14,110
Passenger Car.	24,106	45,458	741	70,305	74,341	11,251
Truck and Bus	5,378	8,884	779	15,041	16,070	2,859
1953 (total)	37,949	55,124	1,543	94,617	96,150	15,720
Passenger Car.	33,106	45,798	809	79,713	81,455	13,044
Truck and Bus	4,843	9,326	734	14,904	14,696	2,676
1954 (total)	33,333	55,155	1,753	90,241	89,141	14,762
Passenger Car.	29,741	47,044	928	77,713	76,794	12,217
Truck and Bus	3,591	8,111	826	12,528	12,347	2,545
1955 (total)	47,374	59,246	1,879	108,499	112,178	18,778
Passenger Car.	42,574	50,189	966	93,730	97,223	15,963
Truck and Bus	4,800	9,057	912	14,769	14,955	2,815
1956 (total)	35,422	62,146	1,757	99,325	100,406	79,872
Passenger Car.	30,873	53,252	875	85,000	85,546	16,494
Truck and Bus	4,548	8,894	883	14,325	14,859	3,378
1957 (total)	36,765	65,150	1,733	103,649	106,940	250,536
Passenger Car.	32,725	56,603	889	90,217	93,542	210,146
Truck and Bus	4,053	8,546	846	13,432	13,398	40,384
1958 (total)	26,783	70,797	1,348	98,928	96,563	20,939
Passenger Car.	23,408	61,570	717	85,696	83,636	17,778
Truck and Bus	3,375	9,226	631	13,232	12,927	3,161
1958:						
Dec. (total)	4,057	4,711	124	8,892	9,376	20,939
Passenger Car.	3,701	3,977	61	7,739	8,046	17,778
Truck and Bus	356	734	63	1,153	1,330	3,161
1959:						
Jan. (total)	2,960	6,742	104	9,806	10,184	21,399
Passenger Car.	2,631	6,028	57	8,716	8,859	17,998
Truck and Bus	329	714	47	1,090	1,325	3,401
Feb. (total)	2,805	5,611	135	8,551	10,270	23,019
Passenger Car.	2,442	4,932	60	7,434	8,962	19,435
Truck and Bus	364	679	74	1,117	1,308	3,584
Mar. (total)	3,336	7,103	117	10,557	11,350	23,862
Passenger Car.	2,930	6,261	62	9,253	9,959	20,181
Truck and Bus	406	842	56	1,304	1,391	3,680
Apr. (total)	3,594	7,297	109	10,999	8,025	20,872
Passenger Car.	3,115	6,390	65	9,569	6,986	17,597
Truck and Bus	479	907	44	1,430	1,039	3,276
May (total)	3,291	6,356	79	9,726	7,796	18,727
Passenger Car.	2,848	5,617	38	8,504	6,853	15,721
Truck and Bus	442	738	41	1,222	843	3,006
June (total)	3,392	6,756	90	10,237	10,294	19,088
Passenger Car.	2,903	5,936	46	8,886	9,022	16,134
Truck and Bus	488	820	44	1,352	1,272	2,954
July (total)	3,588	6,832	112	10,532	11,223	19,877
Passenger Car.	3,188	5,988	65	9,242	9,857	16,853
Truck and Bus	340	844	47	1,290	1,366	3,023
Aug. (total)	1,249	6,593	114	7,957	9,683	21,730
Passenger Car.	973	5,721	67	6,761	8,458	18,677
Truck and Bus	276	874	46	1,196	1,225	3,054
Sept. (total)	2,345	6,819	135	9,298	10,103	22,542
Passenger Car.	1,923	5,850	77	7,850	8,804	19,636
Truck and Bus	422	969	58	1,448	1,299	2,906
Oct. (total)	2,966	7,166	136	10,269	10,884	23,151
Passenger Car.	2,628	6,015	79	8,722	9,374	20,287
Truck and Bus	338	1,151	57	1,547	1,510	2,864

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1939	2,866,796	704,308	3,571,104	1949	5,108,841	1,123,736	6,232,577
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1944	0	124,819	124,819	1954	5,558,897	1,038,045	6,596,942
1945	83,792	313,643	397,435	1955	7,920,186	1,245,018	9,165,204
1946	2,148,699	930,760	3,079,429	1956	5,816,109	1,100,417	6,916,526
1947	3,558,178	1,220,634	4,778,812	1957	6,113,344	1,097,006	7,210,350
1948	3,909,270	1,363,856	5,132,090	1958	4,257,812	874,278	5,132,090
1958:							
Jan.	478,416	79,790	558,206	July	316,408	65,047	381,455
Feb.	396,221	71,024	467,245	Aug.	194,974	55,221	250,195
Mar.	359,464	73,658	433,122	Sept.	102,687	46,353	149,040
Apr.	322,482	73,886	396,368	Oct.	272,241	69,934	342,175
May	352,076	75,291	427,367	Nov.	511,885	93,282	605,167
June	342,228	70,652	412,880	Dec.	608,730	100,140	708,870
1959:							
Jan.	539,451	96,044	635,495	July	548,524	114,687	663,211
Feb.	476,977	99,973	576,950	Aug.	255,831	60,147	315,978
Mar.	575,012	111,355	686,367	Sept.	229,410	79,573	308,983
Apr.	585,789	116,910	702,699	Oct.	537,159	94,993	632,152
May	545,001	114,995	659,996	Nov.	.....	.....	.....
June	554,878	119,544	674,422	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	....
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1954	25,071	35,576	945	61,593	48,279	9,519
1955	5,001	33,387	1,001	39,389	35,900	6,833
1956	3,100	32,358	1,040	36,498	34,405	6,109
1957	3,046	35,687	1,076	39,806	39,774	80,077
1958	2,678	37,872	870	41,420	41,266	8,602
1959:						
Jan.	287	4,450	63	4,800	3,806	7,536
Feb.	311	3,924	81	4,316	4,094	7,364
Mar.	339	4,013	83	4,435	4,459	7,629
Apr.	389	3,474	66	3,928	3,380	7,219
May	363	2,853	59	3,275	2,752	6,849
June	392	3,421	59	3,872	3,683	7,000
July	317	3,564	66	3,948	4,345	7,560
Aug.	210	3,306	77	3,592	3,716	7,848
Sept.	347	3,258	88	3,693	4,065	8,334
Oct.	265	3,571	79	3,915	4,391	9,088

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins							All Other Vinyl Resins		
	Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	Adhesives	All Other Uses	Grand Total
1953	63,691	62,385	129,215	52,353	22,152	22,823	27,790	22,411	77,478	480,299
1954	69,943	56,588	147,284	49,546	34,890	23,676	35,148	26,609	74,090	517,773
1955	83,276	51,424	183,736	64,223	56,357	27,439	53,868	31,853	105,644	657,821
1956	78,063	55,598	206,726	62,931	65,384	28,522	71,859	36,565	115,151	720,799
1957	90,543	56,344	216,517	66,392	81,357	31,519	50,637	41,665	113,396	748,370
1958	72,404	67,594	214,701	63,050	113,583	28,913	68,307	52,904	117,752	801,208
1959:										
Jan.	5,959	8,050	23,818	5,139	11,708	2,442	5,988	3,533	12,648	79,285
Feb.	5,590	9,094	22,638	5,052	11,176	2,325	7,312	4,139	12,601	79,927
Mar.	7,088	8,735	25,086	5,514	13,568	2,537	8,014	4,919	14,257	89,718
Apr.	7,526	10,390	27,226	5,951	14,096	3,038	8,376	5,182	15,282	97,067
May	6,765	10,664	25,561	6,466	13,762	2,583	7,614	4,662	13,972	92,049
June	7,517	11,227	24,711	6,231	12,073	2,625	8,447	5,022	14,783	92.636
July	6,545	9,329	22,645	5,263	12,156	2,850	7,340	4,853	13,284	84,265
Aug.	7,074	10,750	25,069	5,683	12,867	2,602	7,940	4,915	12,379	89.279
Sept.	7,112	11,275	28,106	6,387	11,939	2,904	7,644	5,167	11,540	92,074
Oct.	8,638	12,604	30,838	4,898	14,212	2,927	8,615	5,716	13,422	101,870

Source: Chemical Division, U. S. Tariff Commission.

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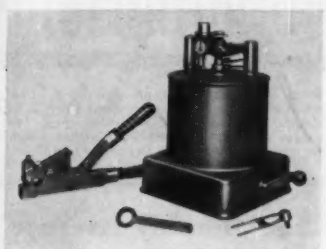

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Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1958 Production Workers (thousands)	1958 Average Weekly Earnings	1958 Average Weekly Hours	1958 Average Hourly Earnings	1959 Production Workers (thousands)	1959 Average Weekly Earnings	1959 Average Weekly Hours	1959 Average Hourly Earnings
Jan.	200.9	$87.48	38.2	$2.29	199.1	$100.28	41.9	$2.45
Feb.	191.3	85.04	37.3	2.28	198.8	101.09	41.1	2.44
Mar.	184.0	87.02	38.0	2.29	201.5	103.74	41.6	2.43
Apr.	176.0	85.88	37.5	2.29	176.0	101.57	42.0	2.47
May	172.3	87.86	38.2	2.30	171.8	101.46	41.8	2.43
June	175.8	91.10	39.1	2.33	196.1	98.74	40.3	2.45
July	175.1	91.89	39.1	2.35	203.4	107.10	42.5	2.52
Aug.	181.2	96.80	40.5	2.39	204.3	105.58	42.4	2.49
Sept.	187.5	97.51	40.8	2.39	208.0	.....	...	...
Oct.	194.5	97.27	40.7	2.39	....	.....	...	...
Nov.	195.3	98.09	40.7	2.41	....	.....	...	...
Dec.	198.2	102.66	41.9	2.45	....	.....	...	...
Tires and Tubes								
Jan.	81.6	98.52	36.9	2.67	76.9	117.55	41.9	2.87
Feb.	78.5	93.02	36.1	2.65	76.2	118.98	41.1	2.86
Mar.	76.0	98.05	37.0	2.65	77.9	122.96	41.6	2.86
Apr.	72.1	95.67	36.1	2.65	66.0	123.98	42.0	2.90
May	70.4	99.48	37.4	2.66	52.2	126.13	41.8	2.89
June	71.2	103.63	38.1	2.72	70.7	108.93	40.3	2.96
July	71.0	106.59	38.9	2.74	79.7	128.74	42.5	2.98
Aug.	72.5	113.96	40.7	2.80	78.7	129.06	42.4	2.96
Sept.	74.1	113.40	40.5	2.80	....	.....	...	...
Oct.	75.3	113.24	40.3	2.81	....	.....	...	...
Nov.	76.2	115.75	40.9	2.83	....	.....	...	...
Dec.	77.1	121.40	42.2	2.87	....	.....	...	...
Rubber Footwear								
Jan.	17.5	74.87	39.2	1.91	17.1	78.20	39.8	1.96
Feb.	17.0	74.68	39.1	1.91	17.1	80.59	39.9	1.96
Mar.	16.7	76.61	39.9	1.92	17.4	79.79	40.7	1.98
Apr.	16.5	75.46	39.3	1.92	12.9	73.05	40.3	1.98
May	16.3	75.85	39.3	1.93	17.7	79.58	39.7	1.84
June	16.3	11.20	40.0	1.93	18.2	81.58	41.2	1.98
July	15.9	75.25	39.4	1.91	18.3	78.60	40.1	1.96
Aug.	16 4	77.18	40.2	1.92	18.4	79.95	41.0	1.95
Sept.	16.8	76.62	39.7	1.93	....	.....	...	...
Oct.	17.1	77.01	39.9	1.93	....	.....	...	...
Nov.	17.2	77.22	39.6	1.95	....	.....	...	...
Dec.	17.1	78.01	39.8	1.96	....	.....	...	...
All Other Rubber Products								
Jan.	101.8	80.94	39.1	2.07	105.1	91.27	41.9	2.21
Feb.	95.8	80.32	38.8	2.07	105.5	91.96	41.3	2.21
Mar.	91.3	79.87	38.4	2.08	106.2	93.02	41.8	2.20
Apr.	87.4	79.87	38.4	2.08	97.1	90.03	41.9	2.22
May	85.6	80.29	38.6	2.08	101.9	92.18	41.3	2.18
June	88.3	83.77	39.7	2.11	107.2	94.98	42.4	2.24
July	88.2	82.92	39.3	2.11	105.4	95.40	42.4	2.25
Aug.	92.3	86.24	40.3	2.14	107.2	93.21	41.8	2.23
Sept.	96.6	89.21	41.3	2.16	....	.....	...	...
Oct.	102.1	88.78	41.1	2.16	....	.....	...	...
Nov.	101.9	88.54	40.8	2.17	....	.....	...	...
Dec.	104.0	92.60	41.9	2.21	....	.....	...	...

Source: U. S. Department of Labor.
Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1952	1953	1954	1955	1956	1957	1958	1959
Jan.	42.96	33.24	34.16	35.07	35.24	34.82	36.31	35.67
Feb.	41.64	33.76	35.00	35.04	36.26	34.82	35.83	35.69
Mar.	41.70	34.10	35.23	34.33	36.70	35.35	36.05	35.71
Apr.	41.79	33.85	35.22	34.23	36.43	35.43	36.00	36.05
May	39.98	34.30	35.34	34.80	36.65	35.40	36.27	36.24
June	41.31	34.11	35.17	34.83	36.67	35.45	36.33	36.05
July	40.37	34.20	35.37	34.61	35.43	35.49	36.51	34.67
Aug.	40.42	33.82	35.19	34.51	34.31	35.15	36.36	33.17
Sept.	39.75	33.69	35.46	33.85	34.35	34.74	36.00	32.99
Oct.	37.52	33.53	35.24	33.93	34.45	35.09	36.23	32.77
Nov.	35.59	33.60	34.80	34.87	34.56	36.06	36.24	32.79
Dec.	33.76	33.52	35.03	34.95	34.56	36.50	35.75	33.02
Average for Year	39.71	33.81	35.10	34.59	35.50	35.36	36.16	34.57

Note: The Government established a ceiling of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1947-1949 = 100)

(Based on man-hours)

	1957	1958	1959		1957	1958	1959
Jan.	145	116	142	July	136	125	172
Feb.	141	114	150	Aug.	141	131	162
Mar.	145	116	156	Sept.	138	136	159
Apr.	132	112	135	Oct.	135	133	145
May	134	113	134	Nov.	131	141	...
June	135	125	155	Dec.	117	140	...

Sales by the Rubber Industry

(in Millions of Dollars*)

	1957	1958	1959		1957	1958	1959
Jan.	496	448	508	July	514	478	519
Feb.	495	413	490	Aug.	514	438	492
Mar.	476	396	506	Sept.	481	464	544
Apr.	490	429	543	Oct.	490	493	582
May	481	428	524	Nov.	431	472	...
June	458	445	520	Dec.	427	518	...

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1957	1958	1959		1957	1958	1959
Jan.	1,047	1,100	998	July	1,045	980	1,075
Feb.	1,036	1,087	1,022	Aug.	1,074	1,024	1,113
Mar.	1,030	1,069	1,030	Sept.	1,074	1,024	1,114
Apr.	1,031	1,047	1,015	Oct.	1,097	1,022	1,119
May	1,024	1,020	995	Nov.	1,101	1,018	...
June	1,027	986	1,013	Dec.	1,092	994	...

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1918	70	40	60.15	1939	24	14⅛	17.57
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19⅛	22.40
1921	21¼	11½	16.36	1942	22½	22½	22.50
1922	28¾	13⅝	17.50	1943	22½	22½	22.50
1923	37¼	24¾	29.45	1944	22½	22½	22.50
1924	40⅝	17⅝	26.20	1945	22½	22½	22.50
1925	121	34⅜	72.46	1946	22½	22½	22.50
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¾	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98	1951	76	52	(a)
1931	8¾	4¼	6.17	1952*	33	26½	29.15
1932	4¾	2½	3.49	1953	31⅞	19⅞	24.21
1933	9¾	2⅜	5.96	1954	34½	19¼	23.61
1934	15⅞	8¾	12.92	1955	52	29⅜	39.16
1935	13¾	10½	12.37	1956	45	26½	34.24
1936	23	13½	16.41	1957	37⅜	26⅝	31.13
1937	26⅞	14	19.39	1958	32⅜	24⅜	28.13
1938	17 5/16	10¼	14.64	1959	49	29¾	36.56

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1952	1953	1954	1955	1956	1957	1958	1959
Jan.	....	29.40	20.22	33.92	41.70	33.32	27.15	30.34
Feb.	....	27.57	19.98	34.90	33.68	30.43	26.32	30.26
Mar.	....	26.59	20.16	31.08	33.68	31.76	26.65	31.62
Apr.	....	24.66	22.06	31.75	31.74	32.23	26.44	33.72
May	....	25.52	21.96	31.35	29.61	32.12	25.51	36.48
June	....	24.42	23.01	34.74	30.54	32.80	26.20	34.31
July	30.52	23.64	24.12	40.84	33.91	32.88	27.70	35.19
Aug.	29.36	23.36	23.26	45.85	35.69	32.13	28.72	38.43
Sept.	27.42	23.06	23.00	48.27	32.64	29.94	29.49	40.22
Oct.	27.26	20.82	26.57	43.81	32.68	29.24	31.06	41.50
Nov.	29.25	20.58	28.07	44.95	35.18	27.47	32.10	45.16
Dec.	31.26	20.92	29.88	48.40	37.01	29.25	30.28	41.46
Average for Year	29.15	24.21	23.61	39.16	34.24	31.13	28.13	36.56

Note: (*) Free trading suspended March 31, 1951, and resumed on July 1, 1952.

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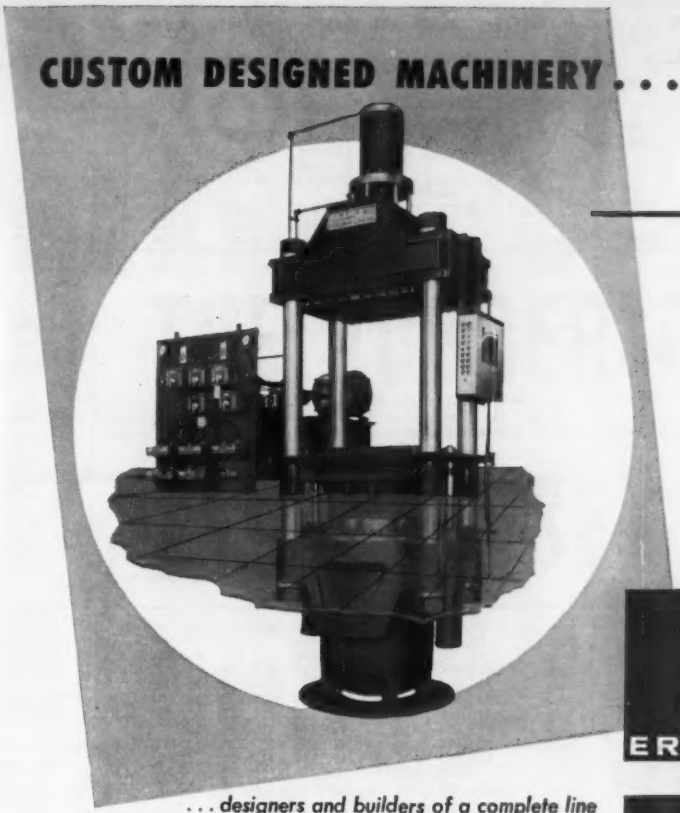

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Various Compounding Materials Consumed by the Rubber Industry

Material	1951	1952	1953	1954	1955	1956	1957
Antimony, Primary							
Short tons	19e	66e	20e	49e	78	156	284
% of total	.001	.004	.001	.004	.006	.010	.024
Asphalt: [a]							
Short tons	21,414	33,288	.....	.....	.. ..	.....	.....
% of total	0.3	0.4	.....	.....	.....	.....	.....
Barite (Barytes):							
Short tons	15,000	18,000	21,000	20,000	25,104	22,101	21,782
% of total	2.13	2.0	2.0	2.0	2.0	2.0	1.0
Carbon Black:							
Short tons	530,614	537,273	566,797	511,813	643,430	622,325	635,781
% of total	93.9	93.1	94.4	93.5	93.5	95.5	95.5
Clay, Kaolin:							
Short tons	231,331	240,982	241,052	247,431	257,223	268,157	301,185
% of total	12.7	13.2	12.8	13.2	11.9	12.0	14.0
Clay, Fire & Stoneware:							
Short tons	.....	9,322	18,475	8,781	2,928	.. ..	.....
% of total	.....	0.1	.2	.1	.2	.....	.....
Lime:							
Short tons	1,126	2,000	1,631	1,555	1,465	2,487	2,799
% of total	(d)	(d)	(d)	(d)	(d)	(d)	(d)
Litharge:							
Short tons	2,641	2,109	2,230	1,768	1,947	2,266	1,898
% of total	1.1	1.5	1.4	1.3	1.3	1.7	1.7
Lithopone:							
Short tons	3,295	1,523	1,723	1,701	2,163	2,000e	....
% of total	3.2	2.5	3.3	3.9	5.0	5.0	....
Mica, Ground:							
Short tons	6,551	5,126	5,668	5,021	7,339	7,021	8,579
% of total	9.0	7.0	7.8	6.3	6.9	8.0	9.0
Sulfur:							
Short tons	84,000	84,000	89,600	84,000	89,600	89,600	89,600e
% of total	1.4	1.4	1.4	1.3	1.2	1.1	1.1
Talc: [b]							
Short tons	70,970	64,476	61,408	58,139	38,309	30,253	28,532
% of total	11.2	10.9	10.0	9.7	5.4	5.0	6.0
Zinc Oxide:							
Short tons	71,507	72,774	78,439	71,058	86,677	80,459	81,745
% of total	48.4	51.2	52.7	50.7	51.5	51.9	54.0

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Reclaimed Rubber
(Including Natural and Synthetic)
(All Quantities in Long Tons)

Year	New Supply	Consumption: Tons	Consumption: % to Crude [a]	Exports	Stocks On Hand at End of Period
1941	274,202	251,231	32.2	13,851	41,750
1942	286,00/ [b]	254,820	64.6	30,405	42,532
1943	304,058 [c]	291,082	59.6	15,678	46,201
1944	260,631 [d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366,700	346,121	26.6	14,722	45,082
1952	274,981	280,002	22.2	11,180	30,664
1953	298,336	285,050	21.3	11,597	32,319
1954	258,101	249,049	20.2	10,232	30,746
1955	326,649	312,781	20.4	13,988	31,498
1956	287,220	270,547	18.8	13,832	34,969
1957	271,647	267,353	18.2	13,021	29,323
1958	259,809	248,156	18.2	11,362	29,063
1958:					
Aug.	22,432	19,347	17.4	900	27,961
Sept.	22,641	21,771	17.7	1,005	26,676
Oct.	26,554	23,563	17.2	1,028	27,340
Nov.	22,450	21,271	17.4	1,051	27,680
Dec.	24,830	23,285	17.5	841	29,063
1959:					
Jan.	25,790	25,002	17.9	1,157	27,157
Feb.	25,290	24,471	18.2	1,041	27,504
Mar.	29,327	27,869	18.8	1,375	27,582
Apr.	21,672	22,380	18.5	1,225	25,131
May	19,441	20,496	18.1	980	23,554
June	26,169	24,998	17.9	1,054	23,448
July	27,884	23,942	16.9	1,236	25,949
Aug.	25,276	22,914	16.6	879	26,165
Sept.	28,130	25,137	17.2	937	27,384

Source: U. S. Department of Commerce.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

Cotton, Rayon and Nylon Tire Fabrics
(In Thousands of Pounds)

	Production: Rayon Tire Cord Net Woven	Rayon Tire Cord Woven	Cotton and Nylon Cord & Fabric [a]	Chafer Fabrics (all fibers)	Total Tire Cord and Fabric	Stocks [b]: Cotton and Nylon Cord & Fabric	Rayon Cord and Fabric
1958:							
Jan.-Mar.	8,372	56,522	25,647	7,367	92,924	11,255	33,913
Apr.-June	.....	.....	30,745	6,020	80,533	11,274	26,327
July-Sept.	.....	.....	31,371	6,467	91,984	11,229	26,428
Oct.-Dec.	.....	.....	34,858	8,466	107,532	12,251	25,936
Total	8,372	56,522	122,621	28,320	372,973	46,009	112,604
1959:							
Jan.-Mar.	77,307	77,307	41,565	9,163	122,661	14,025	22,093
Apr.-June	76,265	76,265	37,102	7,699	116,965	16,811	31,094
July-Sept.	.....	.....	.....	.....	.....	.....	.....
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption
(In Thousands of Barrels of 42 Gallons)

	1953	1954	1955	1956	1957	1958	1959
Jan.	89,634	89,634	96,397	100,642	109,295	107,281	114,720
Feb.	86,458	86,206	88,464	98,088	96,694	95,516	99,759
Mar.	98,158	101,549	105,684	112,412	113,166	108,914	118,995
Apr.	102,044	103,866	111,116	113,034	115,820	118,477	124,917
May	105,918	104,418	115,707	123,560	124,325	125,137	127,049
June	114,703	113,037	120,710	126,833	121,598	125,444	133,695
July	112,969	112,231	115,653	120,708	130,251	130,903	137,141
Aug.	109,124	110,223	121,816	125,847	128,808	129,925	132,875
Sept.	106,158	104,706	113,379	111,574	113,567	120,389	130,264
Oct.	106,037	105,607	112,558	119,204	119,334	125,097	.....
Nov.	99,210	102,393	109,212	112,113	107,705	110,587	.....
Dec.	100,225	104,258	111,034	108,096	112,691	120,305	.....
Total	1,230,629	1,238,346	1,321,730	1,372,116	1,393,254	1,417,975	

Source: U. S. Bureau of Mines.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.
(All Quantities in Long Tons)

Year	Balata: Tons	Balata: Value	Jelutong: Tons	Jelutong: Value	Gutta-Percha & Other Guttas: Tons	Gutta-Percha & Other Guttas: Value
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1951	2,452	1,973,271	1,669	2,608,359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166,837	235	303,116
1954	949	504,065	2,196	2,624,926	417	511,055
1955	1,022	967,369	1,679	1,731,821	284	318,115
1956	1,396	1,111,165	1,851	1,909,447	290	309,615
1957	1,037	670,821	1,680	1,942,067	230	270,487
1958	745	536,820	1,501	1,698,840	157	224,499
1959:						
Apr.	91	59,313	108	135,129	10	16,920
May	90	65,771	115	144,934	51	53,364
June	69	28,122	68	85,116	37	42,085
July	82	76,165	113	107,280	28	34,629
Aug.	54	23,923	123	139,588	40	39,254
Sept.	256	215,453	91	107,626	10	17,230
Oct.	188	254,838	107	187,721	16	13,020

Source: U. S. Department of Commerce.

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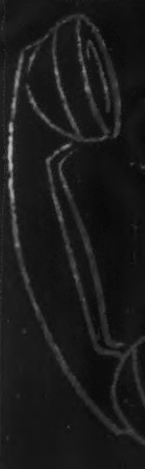

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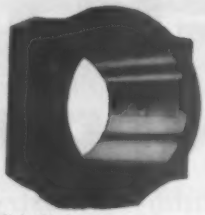

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